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INDIA RUBBER WORLD

Publisher, Edward Lyman Bill

Consulting Editors
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Volume 96 | August 1, 1937 | Number 5

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Published monthly by Bill Brothers Publishing Corp., 420 Lexington Ave., New York, N. Y. Cable Address, ELBILL, New York. Subscription $3.00 per year postpaid in the United States and Mexico; $3.50 per year postpaid to Canada; $4.00 per year postpaid to all other countries.

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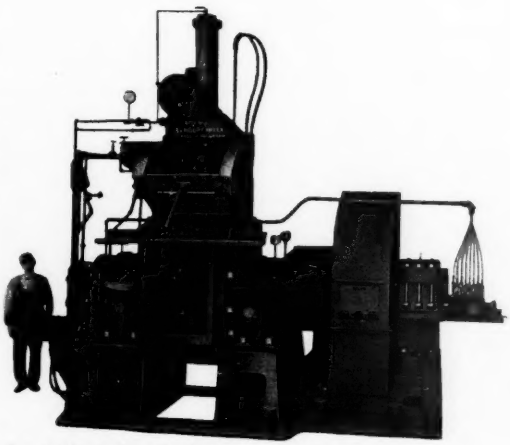
Volume 96 | **New York, August 1, 1937** | **Number 5**

Mastication in the Rubber Industry

Harry Barron

ACCORDING to Wolf[1] last year was the centenary of the invention of the mixing mill. The credit for both the mixing mill and the calender is attributed to Chaffee in 1836. It is not suggested that his was the first machine designed to bring rubber to a state in which it could be manipulated. This was first achieved by Hancock by means of his masticator or "pickle." This machine, the existence of which was kept so secret at the time, consisted of a spike covered cylinder turning inside a chamber.

Hancock's machine may be regarded as the prototype of the present-day internal mixer, as exemplified by the Banbury. It can be claimed that present-day internal mixers represent a great advance in all respects on the "pickle."



Farrel-Birmingham Co., Inc.

Banbury Mixer, Spray-Cooled Type

Origin of Design

Singularly enough, although it is the most widely employed machine in rubber manufacture, the mixing mill has changed but little during a hundred years.

The "preparing machine" of Chaffee differed from Hancock's because instead of rubber being mixed inside a chamber, it was passed between two steam-heated rollers. It must be noted that it is only during recent years that there has been a strong trend to revert to mixing the rubber inside of a chamber.

Improvements relating to the metals employed in the rolls, the channels for passing water and steam, the fitting of bushes, and power transmission have been made different. But fundamentally, present mills are similar to the machine designed by Chaffee. They have grown larger, and are more powerful, but to this day the rolls turn at different speeds.

Burden of Mastication

The process of mastication as at present carried out is very burdensome. Through the history of the rubber industry it has been necessary to employ the heavy and expensive mixing mill to break down raw rubber and to incorporate the desirable ingredients prior to the production of the vulcanized products.

The expense of manipulating rubber by this method is very high, and accounts for one of the major items in the cost of producing rubber goods. Thus even with low priced rubber it is not possible to produce inexpensive products and invade fields otherwise showing promise. During the past few years many purchasers of rubber goods inquired why prices were not decreased to correspond with the dropping price of raw material. The reply that this was due to mastication would be incomprehensible and disbelieved. Yet it is undoubtedly so. Even today the lack of expansion in the use of rubber flooring is due to high prices out of reach of most consumers,

[1] INDIA RUBBER WORLD, Aug., 1936, p. 39.

necessitated entirely by the cost of processing, of which mastication and mixing is one of the chief items. The inability of rubber to make any headway as a road surfacing material is similarly conditioned by this factor.

Energy Consumption

There is something illogical and unscientific in present-day rubber practice as is evident from an examination of the various stages in the manipulation of crude rubber:

a. Rubber trees are tapped. The latex is collected and coagulated. The coagulum is washed, sheeted, and dried to give crepe or smoked sheet. A certain amount of energy is used up in these processes.

b. The rubber is broken down between heated rollers or in an internal mixer. An enormous amount of energy in the form of power and heat is likewise being used up. When the rubber is in a suitable condition fillers are incorporated, which action again consumes a large amount of energy.

c. The mass is calendered and vulcanized, again taking up energy.

What are the returns? A product is obtained which possesses certain physical properties. Analysis of these into tensile strength, elongation, etc., enables us to deduce the energy available, and it is discovered that a certain value is obtained. For specific fillers it is found that there is an excess of energy over an unfilled mixing known as reenforcement.

Energy Losses

It has been shown that a tire-tread mixing, probably the most highly developed technical product that the rubber industry can offer, gives energy returns which are not so good as those obtained by the direct formation of products from latex, without filling materials, i.e., virtually pure vulcanized rubber.[2] What does this mean? Surely it indicates that a great deal of energy is being wasted in rubber processes.

After all, if this energy is consumed in rubber treatment, it should to some extent be transmitted to the rubber and utilized subsequently. In fact it is not; the energy devoted to mastication is entirely lost. Also the rubber is made very sensitive to atmospheric conditions and it ages badly, for which reason it is necessary to incorporate antioxidants. By contrast, latex rubber ages exceedingly well, without any artificial assistance.

Industrial progress is fundamentally directed at the transfer of one form of energy into another more convenient form with the least possible loss. Where raw materials are involved, it is sought to obtain the benefits of whatever intrinsic energy is associated with the raw material. So far as rubber technique is concerned, the use of carbon black demonstrates this admirably because by its use the greatest known amount of energy is made available in manufactured rubber products. This is the reason why this filler is predominant in tire production. But if this maximum rubber energy is less than that of unmasticated, unfilled rubber products, there is a waste of energy.

In various quarters this fact has been fully realized for some time, and efforts have been made to depart from the traditional mastication processes. Complete success has not yet been achieved, but the trend is in existence, and probably it is only a matter of time and work before this problem is mastered. It is being attacked from several different angles, but the object aimed at is the same: namely, to eliminate the mechanical processes of rubber manufacture.

[2] Barron, *India Rubber J.*, 88, 712 (1934).

There are three well-defined trends in this direction. They may be summarized as the latex trend, pre-treating of rubber, and the preparation of rubber powders.

The Latex Trend

The most pronounced and furthest developed process for eliminating mastication is the use of latex instead of crepe or sheet. This is obviously the most important since it represents rubber in its earliest form where no energy has been employed in its treatment. It is the custom to regard these developments as of recent origin. Actually Hancock was using latex even before he invented his "pickle." The use of latex is expanding rapidly particularly in the U.S.A. Its use, although avoiding the necessity of mixing mills and other heavy equipment, is limited. Latex is expensive compared with crepe rubber; it cannot take up sufficient cheapening or reenforcing materials in a satisfactory manner to produce goods of equal suitability to those made by other existing methods; and it requires careful handling. However it is lessening the use of solutions and doughs made via the mixing and dough mills. Popular molded products will in due course be produced from it when the relation between filler and rubber in latex form is better understood. So far as latex is concerned, the "pickle" and the mixing mill are responsible for a century of retarded development.

Perhaps the first real step forward with regard to the development of the use of latex was the process of pre-vulcanization developed by Schidrowitz. Although efforts to incorporate filling materials to obtain an enhanced energy content have thus proved ineffective, much work is being carried on in this direction.

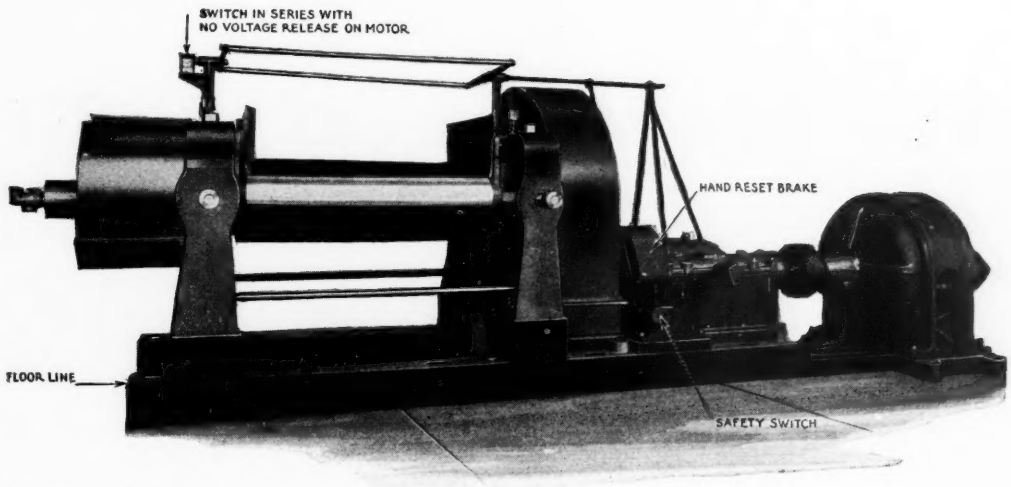
Pre-Treatment of Rubber

Another angle through which the problem has been attacked has been the pre-treatment of rubber, with the object of ameliorating the mastication and mixing processes. Presumably this is regarded as the first step toward elimination. It is interesting to note that here again success has been achieved by Schidrowitz.[3] Working with Ungar, he ignored one of the taboos of rubber technique and developed softened rubber. This is produced essentially by a heat treatment using temperatures far in excess of those normally employed in rubber technique. It has hitherto been one of the axioms of rubber practice that excessive temperature was definitely harmful to the rubber and yielded inferior products after vulcanization. Innumerable academic researches testify to the inadvisability of high temperature and oxidation in rubber processing. In shattering this conception Schidrowitz and Ungar have performed a great service to the rubber industry, because it is quite certain that a re-examination of rubber taboos is now in progress and that many will be discarded with beneficial results to the industry in general.

From the point of view of the abolition of mastication, the use of softened rubber is only half-way to the final solution of the problem. For softened rubber still requires a certain amount of processing on the mixing mills before the mixed compound is ready for vulcanization. The experiments now being carried out by Ungar[4] prove that these pioneers are fully alive to the fact. The obvious idea of heat treatment of latex prior to coagulation after the manner of pre-vulcanization has so far been unsuccessful.

Rubber treatment which appears to link up with the Schidrowitz-Ungar softening process is the high-tempera-

[3] B.P. 368,902 and B.P. 413,869.
[4] *India Rubber J.*, 92, 384 (1936).



Wm. R. Thropp & Sons Co.

Rubber Mixing Mill

ture plasticization now becoming popular in the U.S.A. Comes[5] stated that several large firms have used this method for some time. It is really a hot process, for temperatures of over 400° F. are employed. It was found that mastication times, to achieve similar results, could be reduced from (to take an extreme case) four hours to 12 minutes. It was claimed that the products obtained were not inferior to those which had undergone the standard cold breakdown treatment.

Rubber Powder Application

The greatest disadvantage attached to the use of latex at any time is the cost involved in eliminating the useless water associated with it. For this reason the production of rubber powders seems to be the most promising development toward the ultimate displacement of mastication. In view of the great success achieved in the molding and handling of plastic materials in powder form, it seems that direct rubber molding could be successfully practiced. If instead of coagulating latex and going through all the processes at present necessary for the production of crepe or sheet rubber, the latex could be converted into a fine powder which could be mixed with fillers and processed directly; then rubber technique would be greatly simplified. This is the reasoning behind the urge for rubber powder production. Unfortunately rubber is a very peculiar material, and greater development is necessary before powdered rubber can be directly compounded and molded.

What are the obvious advantages of a powder? A fine powder can be mixed with compounding ingredients by shaking them together. It may eventually be possible to mold this compounded powder directly by methods similar to those employed in the plastics industry. Alternatively, by a brief mixing on a mill (but a mere semblance of mastication) sheets could be formed. Powders could easily be mixed with materials such as cement, asphalt, oils, etc., with which it is difficult normally to mix raw rubber.

None of the existing products have as yet achieved a form suitable for direct treatment. They all have disadvantages. Claims have been made that direct molded products have been achieved, but there does not seem to be any considerable commercial production so far. And this after all is the criterion of success.

[5] India Rubber World, May 1, 1936, p. 41.

Status of Powder Development

There are already several powders on the market. Hopkinson in 1922[6] was probably the first to produce a commercial rubber powder. The powder is very tough and tends to mass together. He apparently was not interested in the material from the point of view of powder, for he compressed it into blocks.

The work which seemed to start the trend for the production of rubber powders was carried out by the Dunlop Rubber Co., Ltd., in 1930, which aimed at obtaining compounded rubber powders; that is to say, the company added fillers to latex and then treated this to obtain a powder.[7] Dunlop has carried its processes much further.

Perhaps the best known is that prepared by the De Schepper process. By this, latex is sprayed on a moving belt which passes through a heated chamber, and the rubber particles produced in this way are prevented from sticking by the addition of a small proportion of zinc stearate. This material is, of course, employed in rubber technique and is not objectionable in limited quantities. As now obtainable, the powder is a light colored regular product available in several particle sizes. The writer has carried out extensive tests with this and has obtained very interesting results.

Another powder is the "Stam," prepared by the incorporation of material into latex prior to spraying which serves to insulate the particles subsequently formed. In the earliest efforts Stam employed no less than 30% dextrine to produce this effect.

Recently,[8] however, powders have been obtained by using much smaller quantities of less unsuitable materials. Among these are diammonium phosphate and similar materials which help to give a very dry product. These powders go under the trade name "Pulvatex."

A still later effort in this production has been to apply small quantities of synthetic resins to latex which, in drying, form a non-adhesive coating on the rubber particles. It has been claimed that this method produces a very fine powder of the order of 75 μ which is resistant to atmospheric influences. The disadvantage of these powders is that materials are introduced which are not always advantageous to rubber practice.

(*Continued on page* 57)

[6] United States patent No. 1,423,525.
[7] B.P. 327,451.
[8] B.P. 388,341 and 438,230.

The Management Audit

Myron H. Clark[1]

MANY an American community has been built up around an industry which in early days located there fortuitously. As the industry grew, the community grew. Their fortunes and destinies became interwoven, and often their fame spread jointly throughout the nation. One comes naturally to associate certain products with certain parts of the country. But today the community is more dependent upon its industries than they upon the community. If an industry fails or moves away, the community itself may suffer an irreparable loss.

Community Influence

Contrary to popular belief, it is not alone the employes who are immediately concerned with the continuous and successful operation of a business—it is the entire community. Doctors, lawyers, merchants, depend upon the company's payrolls for their own livelihood. Real estate owners are vitally affected by local industrial conditions. Banks and their depositors are interested because it may be their money has been loaned to such concerns. In short, everyone in a community is or ought to be interested in the continuity and the profitability of local enterprises.

In the last analysis by far the most vital factor in the profitability of an enterprise is the character of the management. Certainly in the United States today intelligent management with constructive imagination is the only adequate community insurance.

Vigilance

Eternal vigilance is the price of other things besides liberty. It is certainly the price of good management. There are still too many concerns which are living in the hope of returning to "the good old days." The management of any enterprise which is not constantly appraising its situation and adjusting its point of view, its policies, its attitude to changing conditions has a doubtful future. It may in fact be a community liability rather than a community asset. For "the good old days" (whenever they were) are quite definitely gone. The last five or six years have been trying ones and have tested the ingenuity of management. There is every reason to believe that the next five years may present equally challenging problems.

Balanced Management

No business is free from risks. In fact, the art of management lies in knowing which risk to take. It is therefore essential to determine if the risks to be taken or being taken are excessive or in ratio to the possible benefits. The proper appraisal of these risks requires that management ascertain facts, face those facts, and act wisely on them. If the individual enterprises are to prosper and the community thereby to prosper, industry must have balanced management. By this we mean a management which can appraise the problems of the enterprise in terms of all dimensions—production, sales, merchandising, personnel, finance, and public relations.

One of the most helpful devices in attaining balanced management is what may be termed the management audit. Business has long been familiar with the financial audit, whose purpose primarily is to determine the financial condition of a concern and its operating results for a definite period. Such an audit is largely of historical value. On the other hand the purpose of the management audit is to check and evaluate all management's objectives, policies, and even procedures, from the point of view of their future effect upon the successful conduct and continuity of the enterprise.

Industrial Appraisal

Such an audit, made with the proper perspective and from an unbiased point of view, will assist management in determining whether: a. all facts are known; b. all the facts are being faced; c. proper emphasis is being placed on those phases which need emphasis under existing conditions.

Failure on the part of management to determine these points, in many cases, has meant the deferring of readjustments, which, if made in time, might have proved less costly to the company, its employes, and the community.

The management audit is simply a careful appraisal of what the enterprise is trying to do, in terms of the adequacy of the tools and concepts with which it is trying to do the job. The appraisal would concern itself with typical questions such as these:

PRODUCTION: 1. Is the plant, machinery and equipment adequate, modern and properly laid out? 2. Are the processes and methods efficient and up-to-date?

SALES: 1. What are the sales policies, for example, as related to scope of distribution, adequacy of channels, soundness of the selling program? 2. How much is known as to costs of distribution? 3. How does the company determine what products to sell and when to make them?

MERCHANDISING: 1. Is the importance of merchandising recognized so that responsibility for it is properly placed? 2. Are decisions as to costs, selling prices, extent of the line, etc., made by one person whose sole interest is net profits? 3. Are the products competitive and is product research adequate? 4. Does the company attempt to make what it can sell or sell what it makes? 5. How does the company ascertain consumer reaction to its products?

PERSONNEL: 1. Is the organization set-up sound and are lines of responsibility clearly defined? 2. Is the personnel (from the top executives down) properly selected, trained, and placed? 3. What is the status of employer-employe relations? 4. Has the company any definite written policies as to these relations?

FINANCE: 1. Is the capital structure sound and adjusted to the kind of risk involved? 2. Is adequate working capital available? 3. Are accounting methods proper and are the resulting reports and records used as tools of management? 4. Have standards of performance been developed, and is the organization measured against them?

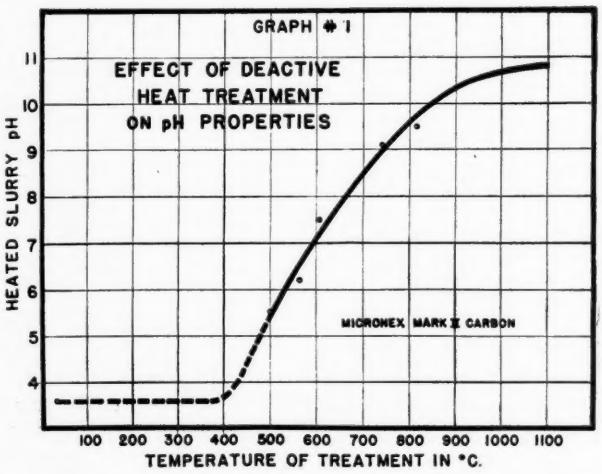
PUBLIC RELATIONS. What are company relations with: a. customers; b. community; c. general public; d. com-

(*Continued on page* 46)

[1] With Myron H. Clark & Associates, 70 State St., Boston, Mass.

pH Properties of Colloidal Carbon[1]

William B. Wiegand[2]


GRAPH # 1
EFFECT OF DEACTIVE HEAT TREATMENT ON pH PROPERTIES
HEATED SLURRY pH
MICRONEX MARK II CARBON
TEMPERATURE OF TREATMENT IN °C.

IF ONE part of colloidal carbon pigment[3] be boiled for fifteen minutes or more with three to ten parts of distilled water, cooled, the supernatant liquid decanted, and the sludge placed in contact with the glass electrode of a pH electrometer, a reading is obtained which is characteristic of the material. A representative list of the pH values thus obtained is shown in Table 1. In this preliminary account will be given some of the factors which have been found to influence pH values of particulate carbon, some of the relations between pH and other properties of colloidal carbon, and finally something of the significance of these pH properties.

Table 1. pH Summary of Carbon Sludges

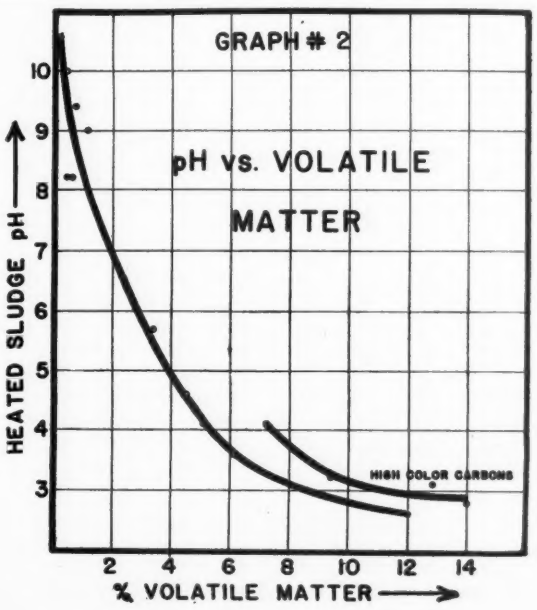
	pH
High-Grade Impingement Carbon Blacks	
"Long" ink carbon (Peerless)	2.6
Easy wetting high color carbon (Neo-Spectra)	2.8
Highest color carbon (Royal Spectra)	3.1
Medium color carbon (Superba)	3.2
High color general purpose carbon (Super Spectra)	4.1
Lampblacks	
High grade	3.1
Rubber grade	3.6
Chinese (native) carbon black	4.2
Rubber Grade Impingement Carbon Blacks	
Slow vulcanizing (Micronex Mark II)	3.6
Standard vulcanizing (Micronex Standard)	4.1
Fast vulcanizing (Ultra Type)	4.6
Degussa CK 3	5.7
Non-Impingement Carbons	
P-33	8.2
Acetylene black	8.2
Bone black	9.0
Fumonex (or Gastex)	9.3

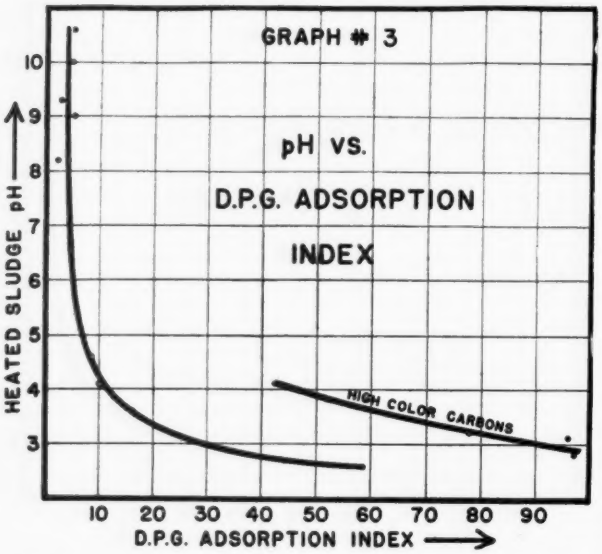
The results of a great number of experiments are shown in the accompanying graphs. It was found that (1) the pH value remained unchanged within the experimental error after repeated extraction of the carbon with boiling distilled water; (2) organic solvent extraction (acetone, ethyl alcohol, ethyl ether, and toluene) did not change this property of the carbon; (3) water-soluble acidity in impingement carbons is less than 0.01% calculated as H_2SO_4, part of which has been shown to be SO_2, but this does not explain their acid properties; (4) carbons produce a greater change in pH value of neutral salt solutions than they do in distilled water; and (5) relations have been found between the pH value, the volatile content, and the adsorption index for diphenylguanidine (D.P.G.).

Interpretation of Experiments

From these results it can be reasonably concluded that the pH change produced by colloidal carbons is an adsorptive phenomenon in which the selective adsorption of the particles of the colloid varies as some function of the content of volatile matter, the higher the volatile the lower (more acid) the pH. By heating in the absence of air, a carbon (Micronex Mark II) having an original pH value of 3.6 has been given a pH value progressively higher (more alkaline) as the temperature of heating is raised above an apparently critical point. The results of this treatment—each carbon sample was held at the temperature noted for one hour—are shown in Graph 1. In Graph 2 the pH values of various types of carbons are shown in relation to their volatile content.[4] Graph 3 shows the

[1] Abstract of a paper presented at the Congres International de Caoutchouc, Paris, France, June 28, 1937.
[2] Director of carbon research, Columbian Carbon Co., New York, N. Y.
[3] The family of carbon pigments ranges in particle size from approximately 250 Å to 5,000 Å. Impingement carbons range from about 250 Å to 700 Å. These are estimated values.
[4] Volatile matter is determined as follows: Fill a tared platinum crucible completely with sample. Place lid on tight. Heat 7 minutes at 950° C. Determine loss in weight and correct for moisture content.





relation of pH values of the different carbons to their D.P.G. adsorption (X) values.[5] Both graphs were made up from the carbons listed in Table 2, which also shows other properties.

The relation between volatile matter and pH seems to offer the key to the situation. Since the volatile content of colloidal carbon is chiefly, if not wholly, made up of oxygen and its compounds with carbon, it seems safe to assume that the carbon-oxygen complex C_xO_y, described by Rhead and Wheeler,[6] may account not only for the original pH values of carbons prepared by different methods, but in addition to that explain the changes in pH observed on deactive heating in the absence of air.

The values of pH shown in Table 1 permit the various families of colloidal carbon to be differentiated. The impingement carbons, including CK 3, which according to present information is an impingement carbon, and the lamp blacks, all give low (acid) pH readings. On the other hand the finely divided thermal decomposition carbons (P-33) and what may be called the furnace type carbons (Fumonex and Gastex[7]) give high (alkaline) pH values. By subjecting impingement carbons to deactive heat treatment[8] their characteristic pH values can be varied from low to high (acid to alkaline) according to the intensity of the treatment as measured by its time and temperature. The high color, specialty carbons used in inks and paints give low (acid) pH readings, and the rubber carbons fall into an intermediate acid range extending from pH 3.3 to pH 4.6.

It will be observed that the slow vulcanizing carbons show lower pH than those which cure rapidly. Most rapid curing of all are the thermal decomposition and deactivated carbons with the highest pH. In paints, enamels, and inks the true impingement carbons, which are relatively slow drying, have low pH. Relatively quick drying carbons (bone blacks) show high pH.

Classification of Colloidal Carbon

In Graph 4 pH values and adsorption indices (X) are plotted as variables dependent on volatile content (V) as abscissae. The curves are smoothly drawn from Graphs 2 and 3 and are intended to indicate only broad general relations. Four general categories of colloidal carbon may be recognized from them:

1. Thermal and deactivated carbons, in general, correspond to definitely alkaline reactions ranging from pH 7.5 upward. The adsorption indices are uniformly below 5, and the volatile contents in general at or below 1%. These carbons include acetylene black, Fumonex and Gastex, in addition to P-33,[9] and also some forms of graphite and are markedly quick curing in rubber compounds. This section also includes impingement carbons which have been strongly heat deactivated to approximately 1.5% volatile or less.

2. The second area may be described as the only blank space in our map. It is populated only by members of the true Ultramicronex series[8] which, owing to their high cost, are not in general use at the present time. The range in pH is from ca. 4.75 to 7.5, in volatile content from ca. 1.5 to 4, and in adsorption or "X" value from ca. 4 to 7.5. This range of carbons represents from the manufacturing point of view a middle ground between carbons produced under essentially oxidizing conditions and those produced under essentially reducing conditions.

3. Next comes the range of commercial impingement carbons used in the rubber industry. The pH ranges from 3.3 to approximately 4.6, the volatile content, from 4 to 7, and the adsorption (X) index, from 8 to 20. This band represents over 85% of all the colloidal carbon now being produced and goes in the main to the reenforcement of tire treads.[10]

4. After the rubber carbons come the specialty carbons

[5] Fifty cubic centimeters of a solution of 2 gr. C.P. diphenyl-guanidine in one liter of alcohol are shaken with 1 gr. sample of carbon for two hours. After filtering, 25 cc. of the filtrate are titrated with 0.01 N hydrochloric acid, using a mixture of bromophenol blue and methyl red as indicator. The result is expressed as percentage of D.P.G. removed.

[6] Rhead and Wheeler, *J. Chem. Soc.*, 103, 461 (1913).

[7] These are produced in furnaces involving partial combustion, the heat of which causes separation of particulate carbon, which is, however, not collected by impingement. The true "thermal" carbons are produced without combustion. Both are "born" in a reducing atmosphere.

[8] Wiegand, W. B., U.S.P. Re. 18,884 (June 27, 1933), Canadian 311,032 (May 5, 1931), United Kingdom 380,345 (Feb. 1, 1932), German 591,951 (Apr. 30, 1932).

[9] Large particle thermal carbons such as Thermax and Velvetex do not appear to have any appreciable pH effect.

[10] The consumption for the year 1936 is estimated at 363,000,000 pounds.

TABLE 2. SYNOPTIC CHART OF COLLOIDAL CARBON PROPERTIES

Grades	Sludge pH	D.P.G. Adsorption Index	% Volatile Matter	Time of Cure in D.P.G. Type Rubber C.P.D.
High Grade Long Ink Carbon (Peerless)	2.6	58.4	12.0	
High Color Carbons				
Easy Wetting H.C. Carbon (Neo-Spectra II)	2.8	97.2	14.0	
Highest Color Carbon (Royal Spectra)	3.1	96.0	12.8	Several
Medium Color Carbon (Superba)	3.2	77.7	9.4	Hours
High Color Carbon (Super Spectra)	4.1	42.5	7.2	
Rubber Grade Carbons				
Fine Particle-Slow Curing (Mark II)	3.6	16.0	6.1	50 Minutes
Standard Curing (Grade A)	4.1	10.1	5.1	30 "
Fast Curing	4.6	8.4	4.5	25 "
Degussa CK 3	5.7	5.3	3.4	17 "
Non-Impingement Carbons				
P-33	8.2	1.8	0.4	15 to 18
Acetylene	8.2	4.1	0.6	Minutes
Fumonex (or Gastex)	9.3	2.5	0.7	
Deactivated Rubber Carbons				
HS-421 (1½ hrs. to 1,500° F. ½ hr. @ 1,500° F.)	9.0	5.1	1.1	
HS-355 (2½ hrs. to 2,000° F. 0 hr. @ 2,000° F.)	10.0	4.6	0.4	10 Minutes
HS-335 (2½ hrs. to 2,000° F. 3 hrs. @ 2,000° F.)	10.6	4.8	9.2	

characterized in general by higher volatile content, lower pH and higher adsorption index. These again classify themselves according to whether they follow the lower pH and adsorption curves or the upper members which have been designated in the graph as "H.C." (high color) adsorption and "H.C." pH.

In the former case the curves terminate at Peerless carbon which, while exhibiting no marked difference as regards color or particle size from the rubber group, is distinguished by its low pH, high volatile and high adsorption value. In the latter group are included the high color paint, lacquer, and enamel carbons such as Super Spectra, Superba, Royal Spectra, and Neo-Spectra, which may, broadly, be distinguished by small particle size[11] as compared to the rubber and ink grades.

Effect of Particle Size

The adsorption curves do not terminate in zero values. This is due to the adsorptive effect associated with specific surface, apart from that due to the combined oxygen. Each particle size will in general correspond to a different value for what has been given the designation "X_o," the latter value thus becoming an indirect method of estimating particle size. Thus, if the volatile content of Super Spectra is entirely removed by high temperature deactive treatment, the "high color" adsorption curve will cross the ordinate at 34%. ($X_o = 34$.)

These differences in particle size must be considered in correlating pH with, for example, the retardation in drying of paints and in the vulcanization of rubber. Thus the retarding effect of a rubber carbon with a volatile content of 7%, but an adsorption value of only 20 is not so great as that of Super Spectra with almost the same volatile content, but with a much higher adsorption index due to its greater specific surface.

Significance of pH Properties

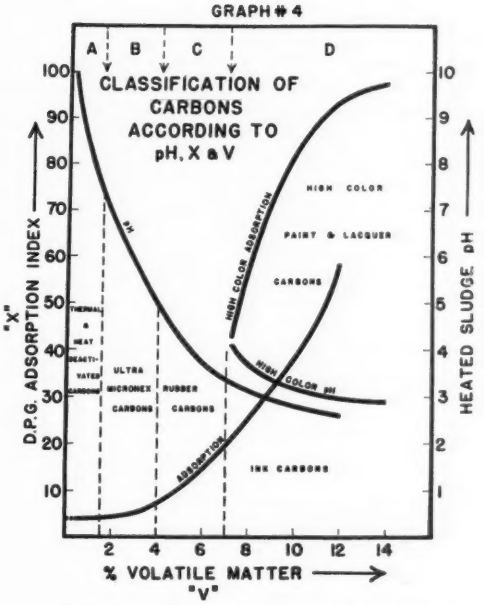
Adsorptive Nature of Colloidal Carbon Acidity

The experimental results, especially those dealing with water extractable acidity, lead to the conclusion that none of the colloidal carbons should be regarded as a true acid, or any of the thermal or highly deactivated carbons as true bases. In pure water the acid carbons tend to adsorb hydroxyl ions, thereupon taking on a negative charge, the corresponding hydrogen ions being more or less loosely associated or bound. With the alkali reacting carbons, the reverse condition holds. In both cases the outer layer or atmosphere of ions is nevertheless capable of affecting the potential of the glass electrode, and perhaps more significantly, capable of influencing the behavior of the carbon in the vulcanization of rubber and the drying of paints.

If, however, these carbons are immersed in a neutral salt solution instead of in distilled water this powerful selective adsorption results in actual chemical decomposition. With an acid carbon immersed in a sodium chloride solution, the selective adsorption toward alkalies will promote hydrolysis, followed by adsorption of caustic soda and the release of free hydrochloric acid. The extent to which such hydrolysis occurs will depend on the pH value of the carbon and on the strength of the acid.

With basic types the reverse condition will, of course, obtain. In general this behavior of carbon is not different from that of other colloids such as Fuller's earth. It is believed, however, that the range (pH 2.6 to pH 10.6), continuity, and amenability to artificial control of the colloidal carbons here described are unique.

GRAPH # 4



pH Properties and Electrical Charge

It is well known that the incandescent particles of carbon in the luminous hydrocarbon flame are positively charged and tend to collect on a negatively charged plate or channel.[12] When immersed in water these particles, by adsorption of hydroxyl ions, will take on a negative charge. The reversal in charge of sugar chars reported by Kruyt[13] when the material had been heated to 1,000° C., together with the change in adsorptive activity toward sodium hydroxide solution, may now be regarded, in the light of the data here presented, as an isolated point in a continuously varying sequence of adsorptive properties, depending on the surface structure of the material and reflected in its pH values.

pH Properties and Combined Oxygen

The chief ingredient in the volatile matter from carbon black is oxygen in the form of oxides of carbon.[14] After removal of volatile matter, elementary analysis shows that the change in composition consists essentially in the elimination of oxygen and, along with it, of carbon.[15] The inference is that the bulk of the oxygen content of a carbon can be removed only in the form of carbon monoxide and carbon dioxide and that it is combined on the surface of the carbon particle in the form of a complex which has been described by Rhead and Wheeler[6] as C_xO_y.

On this view the change in pH which occurs after deactive heating and the differences in pH for various types of carbon as portrayed in Graph No. 4 may be regarded as due to changes in the amount of C_xO_y complex associated with the pure carbon.

Removal of oxygen decreases the adsorptive activity of carbon toward alkaline substances and induces, instead, a selective adsorption toward acidic materials.[15] This, also, may now be regarded as a single member of a continuous series, the pH and adsorptive properties of which vary with the combined oxygen content.

In view of the fact that colloidal thermal decomposition carbons produced under reducing conditions, and heat

[11] Ca. 250 A.
[12] Thomson, "Conduction of Electricity Through Gases," Ch. X.; Wiegand, "Notes on the Carbon Black Flame," *Ind. Eng. Chem.*, 23, 178 (1931).
[13] Kruyt and deKadt, *Kolloid Z.*, 47, 44 (1929).
[14] Johnson, *Ind. Eng. Chem.*, 21, 1288 (1929).
[15] Wiegand and Snyder, *Rubber Age (N. Y.)*, 29, 7 (1931).

deactivated carbons invariably show alkaline pH values, it would now seem permissible to assume that in the entire absence of combined oxygen all members of the colloidal carbon family are characterized by alkaline or high pH values (provided, of course, that the particle size is small enough). The progressive addition of combined oxygen may then be regarded as gradually altering the adsorptive characteristics toward the acid side, in accordance with the trend of the pH-volatile curve, the latter being a measure of the increasing oxygen content. The flattening out of the pH curve at a minimum value of approximately 2.6 suggests complete saturation of the carbon surface with C_xO_y radicals.

pH Properties, Combined Oxygen and Dispersibility

Reference has been made to the fact that the low pH carbons retard vulcanization of rubber and drying of paints and enamels. It must, however, be kept in mind that low pH properties, together with their concomitant high combined oxygen values, play an important constructive role in dispersion. Preliminary experiments carried out in these laboratories indicate that raising the pH of rubber carbons by means of heat treatment, while increasing the rate of vulcanization, may ultimately reach a point where dispersibility declines seriously.

Also, in the family of rubber carbons it is by no means those of the highest pH and the lowest volatile content which have given the best results in the reenforcement of rubber. Thus the central position of the family of rubber carbons in the classification diagram (Graph No. 4) may be looked upon as representing a compromise between high pH with diminished dispersibility on the one hand, and high volatile content involving low pH and excessive retardation of cure, on the other.

pH-C_xO_y and Reenforcement of Rubber

If there be any merit in the hypothesis[16] that the carbon reenforcement of rubber consists essentially in the formation of new physico-chemical complexes between individual macro-molecules of the rubber substance and layers of carbon particles surrounding them, it would seem probable that the C_xO_y complexes are essential to the bond between carbon and rubber, thus also implying a relation between pH and reenforcement. On this view and on the basis of a calculation of the oxygen required to form a monomolecular layer on the surface of a carbon particle of diameter 50 mu[16], the value for such oxygen content (3%) corresponds to a total volatile content of between 5 and 6%.

This calculation is, of course, subject to various errors, but it invites the theoretical suggestion that the maximum reenforcement of rubber is not likely to occur if the combined oxygen content be depressed much below this level. Per contra, combined oxygen much higher than this value probably plays no useful role in the development of what may be termed the "reenforcement bond."

The role of fatty acids in the dispersion of carbon in rubber is now recognized as an important one.[16, 17, 18] The higher the C_xO_y content (with progressively lower pH), the higher appears to be the dosage of fatty acid required to bring out the full reenforcing properties of the carbon.[16] It would thus seem that the C_xO_y contribution to the carbon-rubber bond can reach its highest effectiveness only if the rubber units (macro-molecules) are, as it were, activated by the presence of long-chain polar bodies.

Per contra, the optimum pH (or combined oxygen content) for a rubber carbon is in all likelihood influenced by the available content of fatty acid or its equivalent, in the mixing.

[16] Wiegand, *Can. Chem. Met.*, XXI, 2, 35 (1937).
[17] Goodwin and Park, *Ind. Eng. Chem.*, 20, 621 (1928).
[18] Wiegand and Snyder, *Ind. Eng. Chem*, 23, 646 (1931).

pH-C_xO_y and Paint Vehicles

The considerations respecting rubber apply with added force to many paint and ink vehicles. This derives from the fact that here mechanical work plays a relatively minor role, with the result that the attainment of complete colloidal dispersion necessitates the highest degree of compatibility between carbon and vehicle.

The heat bodying of linseed oil *in vacuo* leaves the dispersing characteristics of this widely used vehicle in a comparatively low state; whereas heat bodying under oxidizing conditions results in a varnish highly responsive, or activated to colloidal carbon pigments of the proper chemical structure. The presence, in considerable proportions, of the oxygen-containing and generally acidic, highly polymerized substances in open-kettle bodied linseed oils, permits, and indeed requires, a correspondingly high C_xO_y, or low pH, in the carbon with which it is ground.

Conclusions

The conclusion is inescapable that ease of dispersion, high "flow" characteristics, freedom from thixotropy, seeding, and other undesirable characteristics, depend upon the development of maximum "carbon-vehicle" as opposed to "carbon-carbon" bond, and that this in turn is governed by the combined oxygen (pH) of the carbon in conjunction with the presence of "activating" bodies in the vehicle.

The use of very low pH (2.6 to 3.0) carbons in ink and paint may involve retardation in drying, just as those rubber carbons having lower pH values retard vulcanization, so that a compromise may be preferable in this case as well. Often such compromise need not influence the selection, as in inks where quick surface drying (skinning) is undesirable and in lacquers and some synthetic enamels where drying occurs either by evaporation or by a non-oxidizing mechanism. In such cases the pH of the carbon may be selected with sole regard to dispersion behavior, color, tone and gloss of the finished product.

Fortunately carbons having pH values covering a wide range are already available so that a selection of the most compatible carbon for any given vehicle can now be made in a systematic, if empirical, manner.

Management Audit

(*Continued from page* 42)

petitors; e. trade associations or similar organizations; f. related industries which may or may not be competitive; g. governmental agencies.

Value of Audit

There is, of course, more to the management audit than merely recording yes or no to such questions. We have stated that the *purpose of the management audit is to check and evaluate all management's objectives and policies from the point of view of their future effect upon the successful conduct and continuity* of the enterprise. Balanced management has learned to think in terms of the problems of the business as a whole. It takes into consideration all the facts. It recognizes its responsibilities to its customers, its employes, and the community. To such a management constantly searching after facts the management audit can be a valuable tool not only as an aid to the enterprise itself, but also as community insurance.

Dispersers and Softeners[1]

J. Behre

IN AN earlier publication I have discussed the role of fats, fatty acids, oils and similar substances in the preparation of rubber mixings. These are usually classed together under the term softeners, in spite of the fact that only in the rarest of cases do they really soften the rubber. As I have frequently mentioned,[2] Burbridge[3] was the first to differentiate between substances which soften the rubber—that is which penetrate into the secondary rubber particles—and those which act as dispersers. Burbridge in fact is of the opinion that the latter are more mechanically mixed with the rubber and wet the rubber particles. It is now my belief, which I have also referred to in the above mentioned paper,[2] that this dispersive action applies also to the fillers, and that the latter as well as the rubber must be well wetted by the disperser.

To supplement the rather scanty available data—Burbridge made his experiments with an unloaded mixture only; while Blow and Garner[4] investigated the effect chiefly of fatty acid salts in a carbon black mix and showed photomicrographs. I have studied a number of fillers and so-called softeners, and in this paper only the plasticity of these mixtures and their microscopic examination shall be reported. The study of the vulcanizates will be reserved for a future paper.

Test Conditions

To obtain the greatest degree of reproducibility in results all working conditions for the preparation of the mixes were predetermined as follows:

Mixing

Mill rolls—Length .....350 mm. (13¼ in.)
Diam. .....138 mm. (5½ in.)
R.P.M. front roll 16 and back roll 20
Friction ratio 1:1,25
Temperature of both rolls: Start 40° ± 2° C.
End 42° ± 2° "
Temperature of the mix.....60° ± 2° "

Materials

First latex crepe from one plantation (Roma) was used exclusively, since earlier tests had shown that with this grade variations in plasticity and nerve as well as in vulcanizing properties were not nearly so great as with even the best grades of smoked sheet. I am well aware that in practice mainly smoked sheet is used, but in view of the fundamental nature of the experiments I was anxious to deal only with materials having the least possible variation in their properties. This is especially important with respect to plasticity, for only with first class grades of crepe can one be certain that plasticity variations will not exceed ± 5%. Also in the case of the fillers and softeners consideration was given to uniformity of the material. Consequently for the whole series of tests only materials from single lots were used.

The fillers used were:

Dixie Clay
Whiting
Magnesium Carbonate, 1
Carbon Black (Arrow)
P-33
Lamp Black (German)

The dispersing agents tested were:

Rubberine-Gel
Stearic Acid
Pine Tar
Rosin Oil
Mineral Oil
Mineral Rubber
Kautschol

Sample Preparation

In making the mixes 700 g. of crepe were passed ten times through the mill with tight rolls; time eight minutes. Then the rubber mass was masticated for eight minutes with a sheet thickness of 6 mm.; next incorporation of ingredients was begun. The plasticity of this rubber was then 28 with a variation of about ± 5%. The dispersers as well as the fillers were now added gradually at the same rate as they were taken up by the rubber. After everything was incorporated (with frequent cutting back), the mix was passed twice through tight rolls and finally removed from the mill as a sheet 6 mm. thick and rolled up. The plasticity tests were made after 24 hours standing at room temperature. The test specimens were always taken from the middle of the roll since experience has shown that the ends undergo a lesser degree of mastication.

Plasticity Measurement

Plasticity determinations were made in a Marzetti plastometer at 80° C. and 30 atmospheres' air pressure. Since about ten minutes were required for the establishment of temperature equilibrium, the rubber extruded in the first 12 minutes was discarded. Thereafter it was collected during one-minute to 15-minute periods, depending on the degree of softness of the mix. In order to facilitate a comparison between mixes of different specific gravity the plasticity number was expressed as the square root of the volume extruded in 15 minutes ($\sqrt{V15}$). Since the rate of plastic flow, by my determinations, was constant during the periods involved, the calculation of 15-minute extrusion volumes from one- or two-minute volumes seems quite allowable.

Percentage of Ingredients

As is customary, all the fillers were used in equal volumes calculated on the rubber. In the graphic representation of the effect of the dispersers the percentages by weight as well as by volume, calculated on the fillers, are given. The carbon black mixes could only be tested in the series with 20%-volume loadings because more heavily

[1] *Kautschuk*, Apr., 1937, pp. 49-60.
[2] *Gummi-Ztg.*, 49, 1299 (1935); *Kautschuk*, 12, 162 (1936).
[3] W. N. Burbridge, *Trans. Inst. Rubber Ind.*, 1, 429 (1926).
[4] C. M. Blow and T. L. Garner, *Trans. Inst. Rubber Ind.*, 10, 446 (1935).

TABLE 1

Filler: Dixie Clay—20% Volume Loading

Dispersers (Vol. % on Filler)	0		2		5		10		12		15		16		20		25		30		35	
	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity
1. Rubberine-Gel	..	..	16′	62.5	14′	63.5	16′	77	16′	81.5	14′	83	14′	84	14′	88	15′	95	..	...	15′	97
2. Stearic Acid	..	..	16′	50	14′	61.5	..	..	20′	80.5	..	..	20′	78.5	22′	85	21′	77.5	..	...	..	..
3. Pine Tar	..	..	..	..	..	..	20′	73	20′	76	14′	78	18′	84.5	18′	88	..	..	..	..	..	..
4. Mineral Rubber	..	..	..	..	..	..	22′	68.5	21′	64.5	..	..	21′	62.5	18′	65	16′	62	..	..	..	..
5. Rosin Oil	..	..	..	..	..	..	20′	66	20′	64	14′	57.5	20′	65.5	20′	70.5	..	..	..	..	..	..
6. Mineral Oil	..	..	..	..	..	..	20′	62	20′	..	..	..	20′	64	20′	64	..	..	..	..	..	..
7. Kautschol	..	..	..	..	..	..	20′	69	20′	64	15′	77.5	20′	68	20′	86	15′	95	..	..	..	..
No addition	16′	62.5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40% Volume Loading																						
1. Rubberine-Gel	..	..	..	..	24′	51	24′	58	24′	79	..	..	24′	92	24′	107	..	..	24′	120	..	..
2. Stearic Acid	..	..	..	..	36′	47	36′	66.5	38′	67	..	..	36′	70.5	32′	73.5	..	..	..	..	..	..
3. Pine Tar	..	..	..	..	..	..	30′	55.5	28′	60	..	..	28′	74	26′	82	..	..	..	..	..	..
4. Mineral Rubber	..	..	..	..	..	..	34′	30.5	34′	33	..	..	34′	44	32′	46.5	..	..	..	..	..	..
5. Rosin Oil	..	..	..	..	..	..	28′	45	26′	47.5	..	..	26′	49	26′	49.5	..	..	..	..	..	..
6. Mineral Oil	..	..	..	..	..	..	28′	42	28′	43	..	..	28′	52	26′	53	..	..	..	..	..	..
7. Kautschol	..	..	..	..	..	..	30′	63	30′	66.5	..	..	30′	70.5	28′	73	..	..	..	..	..	..
No addition	24′	34	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
80% Volume Loading																						
1. Rubberine-Gel	..	..	..	..	..	..	48′	22	48′	38.5	..	..	45′	82	45′	79.5	..	..	..	..	..	..
2. Stearic Acid	..	..	..	..	..	..	54′	17.5	54′	17	..	..	52′	27	52′	35	..	..	..	..	..	..
3. Pine Tar	..	..	..	..	..	..	54′	0	50′	0	..	..	42′	11.5	40′	12	..	..	..	..	..	..
4. Mineral Rubber	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5. Rosin Oil	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6. Mineral Oil	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7. Kautschol	..	..	..	..	..	..	52′	0	52′	0	..	..	..	0	..	0	..	..	..	..	..	..
No addition	63′	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

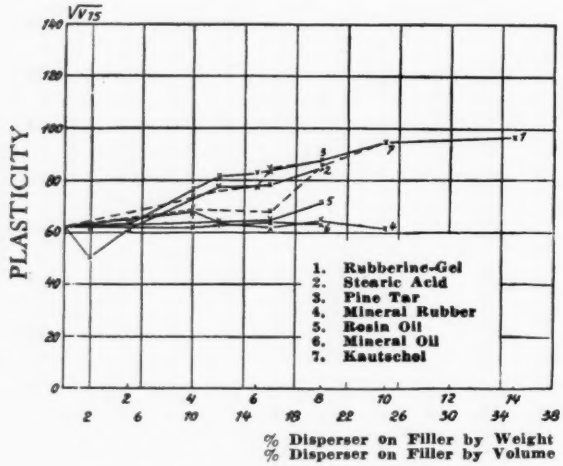


Fig. 1. 20 Parts Dixie Clay by Volume

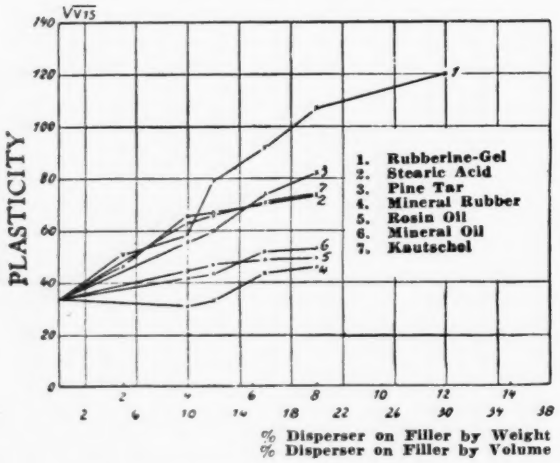


Fig. 2. 40 Parts Dixie Clay by Volume

loaded mixes cannot be extruded by 30 atmospheres' air pressure.

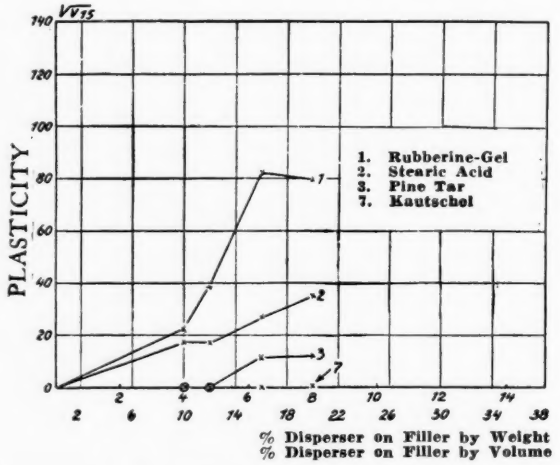


Fig. 3. 80 Parts Dixie Clay by Volume

Test Results

In judging the results and evaluating the individual dispersers several factors must be taken into consideration. For one thing it is natural to try to attain as high plasticity as possible in the mixes because this lightens the work of calendering and tubing. Then again it is desirable to keep mixing time as short as possible and not lengthen it by the addition of dispersers. Finally, the quality of the vulcanizate should not suffer by the additions.

Dixie Clay—Filler

In this work I will, as already indicated, deal only with the first two points. If we consider Table 1 and Figures 1 to 3—Dixie Clay as a filler—it will be seen that the dispersers fall into two groups: Rubberine-Gel, stearic acid, pine tar, and Kautschol, which increase the plasticity; while rosin oil, mineral oil, and mineral rubber produce practically no change in the degree of softness of the lightly loaded mixes and increase it but slightly in the case of the 40% volume loading. In the case of the 80% (volume) Dixie Clay mix only Rubberine-Gel, stearic

TABLE 2

Filler: Whiting—20% Volume Loading

Dispersers (Vol. % on Filler)	0 Mixing Time	0 Plasticity	10 Mixing Time	10 Plasticity	12 Mixing Time	12 Plasticity	16 Mixing Time	16 Plasticity	20 Mixing Time	20 Plasticity
1. Rubberine-Gel	..	..	14′	79	16′	79.5	16′	81	14′	80.5
2. Stearic Acid	..	..	15′	75	15′	78	14′	79	14′	93
3. Pine Tar	..	..	14′	66.5	14′	76	14′	70.5	12′	71
4. Mineral Rubber	..	..	14′	58	14′	58	14′	60	14′	61
5. Rosin Oil	..	..	14′	64.5	14′	69	14′	70.5	14′	81
6. Mineral Oil	..	..	14′	64.5	14′	68	14′	77	14′	74
7. Kautschol	..	..	14′	62.5	14′	69	14′	70	13′	80.5
No addition	16′	77	..	..	..	..	..	..	..	..
40% Volume Loading										
1. Rubberine-Gel	..	..	20′	65.5	22′	73.5	..	..	20′	73.5
2. Stearic Acid	..	..	22′	64.5	20′	70	..	..	20′	79
3. Pine Tar	..	..	20′	64.5	20′	68.5	20′	76	20′	72
4. Mineral Rubber	..	..	20′	54	20′	50	20′	47	20′	51
5. Rosin Oil	..	..	20′	57.5	20′	64	20′	67	20′	64.5
6. Mineral Oil	..	..	20′	62	20′	65	20′	70.5	20′	82
7. Kautschol	..	..	20′	70	20′	72	20′	79.5	20′	79.5
No addition	22′	62	..	..	..	..	..	..	..	..
80% Volume Loading										
1. Rubberine-Gel	..	..	32′	57	30′	56	30′	66	30′	72
2. Stearic Acid	..	..	36′	70.5	34′	69.5	34′	76.5	26′	85
3. Pine Tar	..	..	30′	52	28′	49	28′	58	28′	68
7. Kautschol	..	..	33′	55	28′	55	28′	51.5	28′	71.5
No addition	34′	36.5	..	..	..	..	..	..	..	..

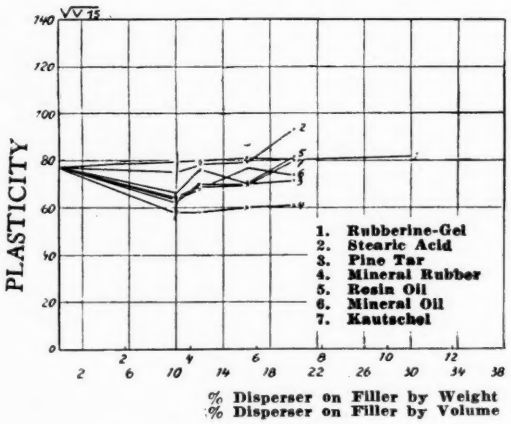


Fig. 4. 20 Parts Whiting by Volume

acid, and pine tar increase the plasticity; while with Kautschol the mix can no longer be extruded. In this series Rubberine-Gel produces by far the highest plasticity figures; also, the mixing times are the shortest. It should also be remembered that these values were obtained with a laboratory mill; on a large mill not only the times, but also the differences between the mixes with the various dispersers are greater. I will come back later to these values.

Whiting—Filler

The second series of tests—with Whiting (see Table 2 and Figures 4 to 6)—presents quite a different picture. In this case at 20% volume loading hardly any increase in plasticity occurs; only stearic acid, in additions of over 7% volume, effects a noticeable increase in the plasticity. At a loading of 40% volume of Whiting, the same results in general reoccur while at 80% volume loading—at which only the four best dispersers were tested—stearic acid shows a distinct superiority. Then follows Rubberine-Gel, then pine tar, and finally Kautschol. The testing of the remaining materials was omitted since, of course, the previous results had shown the sequence of effectiveness of the dispersers to be independent of the amount of loading.

Magnesium Carbonate—Filler

The third filler tested is Magnesium Carbonate, 1.

TABLE 3

Filler: Mag. Carb., 1—20% Volume Loading

Dispersers (Volume % on Filler)	0 Mixing Time	0 Plasticity	10 Mixing Time	10 Plasticity	12 Mixing Time	12 Plasticity	16 Mixing Time	16 Plasticity	20 Mixing Time	20 Plasticity
1. Rubberine-Gel	..	..	18′	54	24′	63.5	22′	66.5	18′	73
2. Stearic Acid	..	..	26′	87.5	26′	91	30′	107	30′	115
3. Pine Tar	..	..	24′	39.5	24′	53	24′	63	24′	66
4. Mineral Rubber	..	..	24′	48	24′	45	22′	45	22′	45
5. Rosin Oil	..	..	23′	39.5	22′	38	22′	45.5	22′	49
6. Mineral Oil	..	..	24′	46.5	24′	43	22′	35	22′	42
7. Kautschol	..	..	26′	43	24′	38	24′	43	23′	48
No addition	20′	46	..	..	..	..	..	..	..	..
40% Volume Loading										
1. Rubberine-Gel	..	..	36′	37	34′	43.5	32′	64	..	..
2. Stearic Acid	..	..	45′	87.5	45′	87.5	42′	94	42′	89
3. Pine Tar	..	..	45′	34	45′	36.5	45′	54.5	42′	66.5
7. Kautschol	..	..	45′	22	42′	26.5	40′	29	38′	29
No addition	36′	11.5	..	..	..	..	..	..	..	..

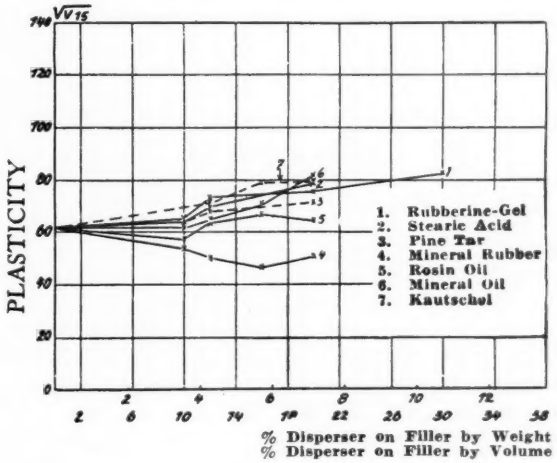


Fig. 5. 40 Parts Whiting by Volume

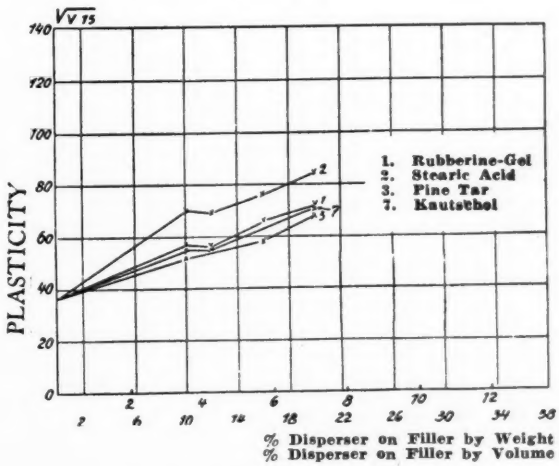


Fig. 6. 80 Parts Whiting by Volume

Table 3 and Figures 7 and 8 show that in this case stearic acid is far superior to all the other dispersers. This high plasticity is doubtless due to the formation of a soap; it is remarkable, however, that this magesium stearate should be formed at such low temperatures. The second best plasticizer is Rubberine-Gel; the third, pine tar; while the remaining materials have no effect in the 20%-volume loaded mix. With the 40%-volume mixes the same sequence of plasticizing effect is found, except that Kautschol produces a slight increase.

TABLE 4
Filler: Arrow Carbon Black—20% Volume Loading

Dispersers (Volume % on Filler)	0		10		12		16		20	
	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity
1. Rubberine-Gel	..	..	24′	37	23′	35	23′	38	23′	40
2. Stearic Acid	..	..	24′	38	24′	37.5	22′	40	22′	44.5
3. Pine Tar	..	..	24′	38	24′	50.5	24′	49	24′	46.5
4. Mineral Rubber	..	..	..	..	..	..	23′	30.5	..	..
5. Rosin Oil	..	..	..	..	..	..	22′	30	..	..
6. Mineral Oil	..	..	..	..	..	..	22′	25	..	..
7. Kautschol	..	..	24′	43	24′	49.5	24′	50.5	24′	49
No addition	26′	29.5	..	..	..	..	..	..	..	..

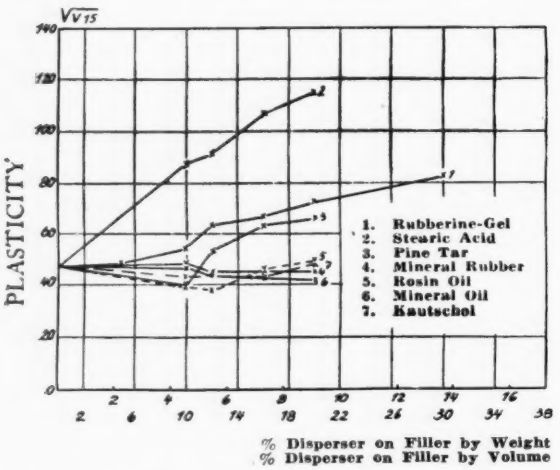


Fig. 7. 20 Parts Magnesium Carbonate, 1, by Volume

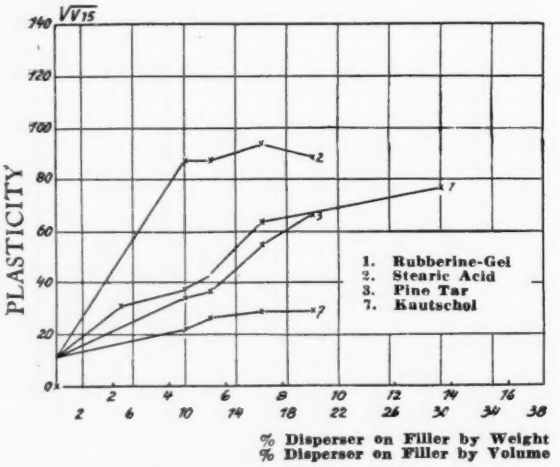


Fig. 8. 40 Parts Magnesium Carbonate, 1, by Volume

Arrow Gas Black—Filler

The fourth series deals with Arrow gas black (see Table 4 and Figure 9). As already pointed out, only the 20% volume loadings could be tested. Here the striking thing is that the two groupings (of dispersers) again appear, but that in the group of plasticizers the sequence is quite different from that found with the other fillers. Kautschol and pine tar here effect the greatest increase; while Rubberine-Gel shows the least. Mineral rubber, rosin oil, and mineral oil have no effect at all.

P-33—Filler

The fifth filler investigated is P-33, at 20 and 40% volume loadings (see Table 5 and Figures 10 and 11).

TABLE 5
Filler: P-33—20% Volume Loading

Dispersers (Volume % on Filler)	0		10		12		16		20	
	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity
1, Rubberine-Gel	..	..	15′	73	15′	75	15′	77	15′	79.5
2. Stearic Acid	..	..	15′	88	15′	86	15′	86	15′	87
3. Pine Tar	..	..	15′	66	15′	70	15′	88	15′	97
4. Mineral Rubber	..	..	..	..	..	..	15′	66	..	..
5. Rosin Oil	..	..	..	..	..	..	15′	66	..	..
6. Mineral Oil	..	..	15′	69.5	14′	70	..	..	15′	69
7. Kautschol	..	..	15′	86	15′	83	15′	88	15′	90
No addition	18′	69	..	..	..	..	..	..	..	..
40% Volume Loading										
1. Rubberine-Gel	..	..	23′	57	22′	65	22′	65	22′	73.5
2. Stearic Acid	..	..	20′	68	21′	72.5	21′	80	21′	89
3. Pine Tar	..	..	23′	72	23′	72	22′	72	22′	76
4. Mineral Rubber	..	..	..	..	..	..	20′	55	..	..
5. Rosin Oil	..	..	..	..	..	..	20′	61	..	..
6. Mineral Oil	..	..	21′	62	20′	67	..	..	20′	67
7. Kautschol	..	..	23′	72.5	23′	74	23′	72	21′	73
No addition	25′	51	..	..	..	..	..	..	..	..

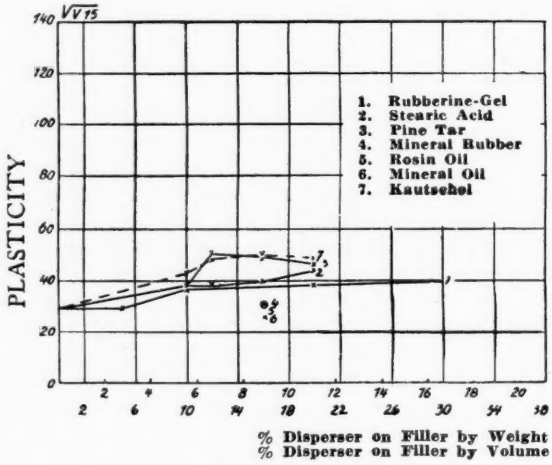


Fig. 9. 20 Parts Arrow Carbon Black by Volume

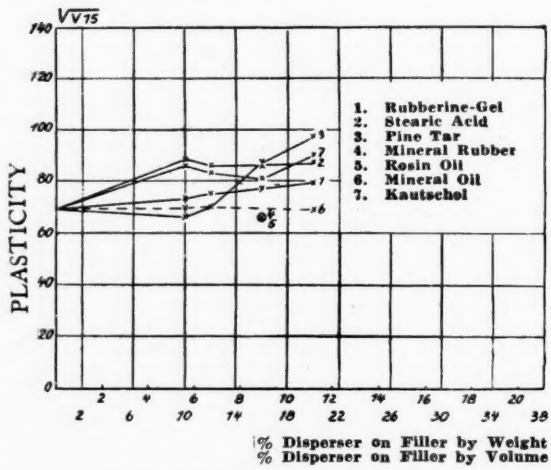


Fig. 10. 20 Parts P-33 Carbon Black by Volume

The greatest plasticizing effect is shown by pine tar, Kautschol, and stearic acid. Rubberine-Gel comes next, but is better than mineral rubber, rosin oil, and mineral oil. In the 40% mixes stearic acid gives the best results but only in large doses.

German Lamp Black—Filler

The last filler investigated was a German lamp black (Table 6 and Figures 12 and 13). Here there is practi-

TABLE 6

Filler: Lamp Black—20% Volume Loading

Dispersers (Volume % on Filler)	0		10		12		16		20	
	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity
1. Rubberine-Gel	.. ..	..	13′	58	13′	64	12′	65	12′	67
2. Stearic Acid	.. ..	..	14′	49	14′	59.5	13′	68	12′	74.5
3. Pine Tar	.. ..	..	13′	60.5	13′	65	..	..	12′	65
7. Kautschol	.. ..	..	14′	59.5	14′	67	14′	67	14′	71
No addition	15′	47.5	..	..	..	..	..	..	..	..
	40% Volume Loading									
1. Rubberine-Gel	.. ..	..	18′	39.5	18′	45.5	18′	44	18′	45.5
2. Stearic Acid	.. ..	..	20′	49	20′	48	..	..	20′	51.5
3. Pine Tar	.. ..	..	20′	42.5	..	..	18′	42.5	18′	40
7. Kautschol	.. ..	..	20′	38	18′	42.5	18′	49	18′	45.5
No addition	20′	31	..	..	..	..	..	..	..	..

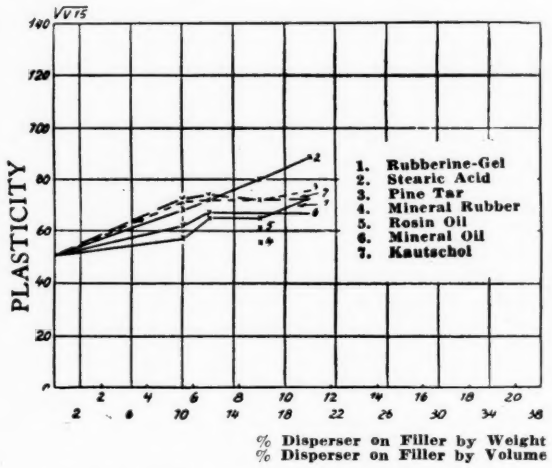


Fig. 11. 40 Parts P-33 Carbon Black by Volume

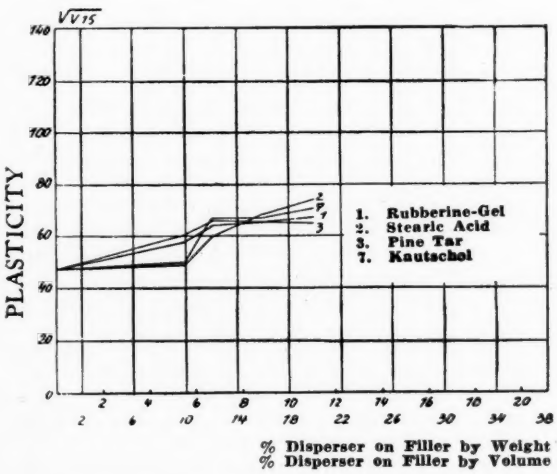


Fig. 12. 20 Parts German Lamp Black by Volume

cally no difference at all in the effect of the four substances tested. Noteworthy is the very slight increase in plasticity caused by the additions.

Pure Gum Compound

All the tests just discussed were made on loaded mixings, and it now appeared interesting, in view of the differentiation between softeners and dispersers which I have constantly emphasized, to study the effect of the same materials in pure gum. To this end 700 g. batches of first latex crepe were again premasticated and to them were added the softeners and dispersers used in the first

TABLE 7

Softeners (Volume % on Rubber)	0		0.4		1		2		3		5	
	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity	Mixing Time	Plasticity
1. Rubberine-Gel	.. ..	..	14′	61	14′	66	14′	70	12′	68	14′	68.5
2. Stearic Acid	.. ..	..	14′	47.5	14′	67.5	14′	73.5	10′	68	11′	85.5
3. Pine Tar	.. ..	..	..	..	10′	70	..	..	10′	74	10′	91
4. Mineral Rubber	.. ..	..	..	..	8′	68	..	..	10′	72.5	10′	69
5. Rosin Oil	.. ..	..	14′	72	14′	76.5	14′	80.5	14′	82	14′	100.5
6. Mineral Oil	.. ..	..	14′	70	14′	72.5	14′	77.5	14′	77.5	14′	88
7. Kautschol	.. ..	..	..	..	10′	70	..	..	10′	68	10′	77.5
8. Reogen	.. ..	..	14′	80.5	14′	82	14′	90	14′	96.5	14′	107.0
No addition	14′	60	..	..	..	..	..	..	..	..	..	..

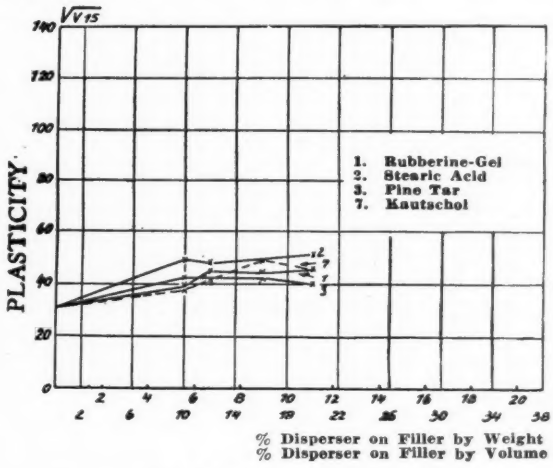


Fig. 13. 40 Parts German Lamp Black by Volume

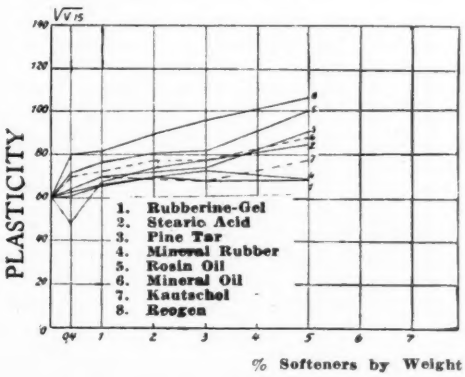


Fig. 14. Plasticity of First Latex Crepe with Different Softeners

tests. Also the Vanderbilt-plasticizer Reogen was included.

As may be seen from Table 7 and Figure 14 the order of effectiveness is here quite different from that found with loaded mixes. Not counting Reogen, which even at a dosage of 0.4% shows a strong plasticizing effect, rosin oil is the most effective; then follow pine tar, mineral oil, stearic acid, Kautschol, mineral rubber, and Rubberine-Gel in decreasing order of effectiveness. All these substances therefore cause an increase in plasticity, which, however, is notable only in the cases of rosin oil and mineral oil. But, as we have seen, these are just the two materials which produce no effect in loaded mixes. Mineral rubber, which also does not affect plasticity in loaded mixes, does produce an increase here, which, however, is no greater than that of Rubberine-Gel. Since this ma-

(*Continued on page 57*)

British Rubber Research[1]

MANY results of the work coming under the supervision of the Technical Research and Development of New Uses Committee have been handed over to the Rubber Producers' Research Association for patent protection and commercial development. The following notes deal briefly with certain aspects of the work during 1936 other than those coming under the purview of the Rubber Producers' Research Association.

Chemical Research

BORON TRIFLUORIDE DERIVATIVES. The action of a number of inorganic fluorides on rubber and on mixtures of rubber with other substances has been studied. Boron trifluoride in particular yields derivatives of rubber of good appearance and solubility, which appear to be suitable for incorporation in paints. Phosphorus pentafluoride yields somewhat analogous products.

CHLORO-ETHER DERIVATIVES. Various derivatives have been otained by the addition of Methyl chlorobenzyl ether and other chloro-ethers to rubber. The derivative obtained, using chloro-benzyl ether, is of possible utility, but all these substances are probably too expensive to produce to be other than of theoretical interest.

PHOSGENE DERIVATIVE. Phosgene has been added to rubber, but the utility or otherwise of the product is at present undetermined.

CHLORINATED NITRITED CRUMB RUBBER. Numerous specimens of this product have been obtained, but their properties are such as to indicate that employment of nitrited crumb rubber offers no particular advantages for chlorination purposes.

INTERACTION OF RUBBER WITH VARIOUS REAGENTS. The interaction of rubber with sulphur dioxide, anhydrosulphuric acid, and unsaturated esters of the type of linoleic ester has been investigated, but in no case are the reaction products of a promising nature. Preliminary experiments have been carried out on the incorporation of unsaturated hydrocarbons with rubber.

ETHYL HYPOCHLORITE RUBBER. A modified process for the preparation of this substance has been worked out which gives a uniform product of good quality in a more convenient way than heretofore. The composition of the product is somewhat different from that of the material obtained by the original method, but this does not adversely affect its properties.

HYPOHALOGENITE DERIVATIVES OF RUBBER. The method for obtaining these derivatives has been more fully worked out, and the properties of the various materials studied. The process offers a convenient method of obtaining chlorinated rubbers of a different type from those which are at present on the market. The products on the whole show an unexpectedly close resemblance to those obtained by the ethyl hypochlorite process, and possibly they may supersede the latter.

Technological Research

BORON TRIFLUORIDE DERIVATIVES. Further work on these substances indicates that it is very doubtful whether they are of themselves likely to be of practical importance. They may have value when used with other substances.

PHOSPHORUS PENTAFLUORIDE DERIVATIVES. These do not appear to be promising from the point of view of film formation or as lacquers, but there is some indication that they might prove useful as molding materials, and their investigation from this point of view is being considered further.

ETHYL HYPOCHLORITE RUBBER. Further work has been carried out on the standardization of this material, and, as a result, it would seem that it is now practicable to reproduce a standard quality. Experiments with regard to the preparation of films for the purpose of wrapping papers and the like are being continued.

HYPOHALOGENITE DERIVATIVES OF RUBBER. A considerable amount of work has been carried out on the hypohalogenites from the point of view of their use as lacquers and as films for wrapping purposes, etc., but it is not yet possible to give a definite opinion as to their commercial value.

The hypohalogenites dry rapidly at room temperature and in technical work would need no stoving or possibly no further application of heat beyond that which could be applied by a tunnel-type of lacquering machine.

CHLORINATED RUBBER. Molding experiments with and without fillers, plasticizers, etc., have been made on Tornesit, "powdered" chlorinated rubber, and on the chlorination products of nitrited crumb, but no results have been given out.

SYNTHETIC RESINS CONTAINING RUBBER. Technical trials are proceeding on promising resins that have been produced.

RUBBER DERIVATIVES AND TARS. Rubber is readily miscible with bitumens yielding stable products, but chlorinated rubber and rubber hydrochloride are not compatible with bitumen. Rubbone dissolves readily in all types of coal tars to give stable products of increased viscosity; whereas nitrite crumb furnishes stable complexes with tars only up to a concentration of 3% of the rubber derivatives.

The addition of chlorinated rubber to high aromatic tars confers noteworthy properties of elasticity and toughness on the resultant complexes. Similar elastic blends are obtainable by the chlorination of solutions or dispersions of rubber in tar oils with subsequent addition of pitch.

RUBBER DERIVATIVES AND RESINS. The blending of chlorinated rubber with resins of bakelite type yields semi-transparent machineable products with breakdown voltage properties superior to those of bakelite-woodmeal products. Chlorinated rubber may also be incorporated with trolitul and polyvinyl acetate resins, the resultant mixtures showing promise as bases for lacquers and varnishes.

LAMINATED PRODUCTS FROM CHLORINATED RUBBER. Laminated products are obtainable when layers of material such as linen or paper are impregnated with chlorinated rubber and subjected to pressure at elevated temperatures. Depending on the temperature and speed of release of pressure, products ranging from thin hard boards to highly expanded vesicular structures are obtained. These laminated materials possess good insulating and negligible water absorption properties.

[1] Summary of work accomplished in 1936 by Technical Research and Development of New Uses Committee of the British Rubber Research Board. Abstracted from The Rubber Growers' Association, Inc., twenty-eighth Report of the Council, Apr. 21, 1937.

CHLORINATION OF RUBBER. Rubber is readily chlorinated when left in contact with liquid chlorine at –40° C. for 30 minutes. The chlorinated material is colorless and contains 55% of chlorine. Pre-treatment of the rubber before chlorination affects the tensile strength of the product; for example, the chlorinated material furnished by latex coagulated rubber is much tougher than the corresponding material made from rubber which has been milled. At –40° C. liquid chlorine also readily attacks vulcanized crumb, nitrate crumb, Rubbone, and rubber hydrochloride.

Rubber/Wool Investigation [2]

APPLICATION OF RUBBER TO WOOL. Wool is, comparatively speaking, an expensive raw material. Wool has certain valuable and unique properties, and any application of rubber should, therefore, be aimed at preserving as much as possible these desirable qualities. It is well known that the wetting of wool fibers by rubber latex is a difficult matter. There are on the market numerous so-called wetting agents, but it is found that with increasing rubber content in the latex, the percentage of them required to give the same rate and degree of wetting increases very rapidly.

A series of compounds has been found which will increase the wettability of the fiber by latex, cause deposition of the negatively charged latex particles on the fiber, and give the rubber and wool substance an affinity one for the other. It is possible to latex treat yarns in hank form.

THE PROPERTIES OF RUBBER TREATED WOOL MATERIALS. Sufficient preliminary work has been carried out to enable certain conclusions to be drawn.

ROVINGS AND YARNS. It is possible to take a 2-dram roving, i.e., a yarn with very little twist, and increase, by rubber treatment, its strength from 1½ to 6 ounces. The possibilities of such a material appear to lie in the production of a twistless yarn (with elimination of spinning) of strength equal to a twisted yarn, but of greater fullness. Further, from experiments on fabrics, it is concluded that materials from this yarn will have greatly increased wear.

FABRICS. Tests carried out on fabric treated with rubber indicate that wear and strength can be markedly increased. The application of a pigmented latex produces an interesting effect that may have possibilities.

FELTS. Considerable success has been achieved in making felts from Scotch Blackfaced and other low-grade wools direct from the carded web. The felt produced requires no milling and could be used, it is believed, everywhere where cheap felts are at present used.

A few experiments have been conducted on the milling of fabrics treated with rubber; the shrinkage is reduced in proportion to the rubber content, but a more compact felt appears to be produced. The possibilities of such a treatment for printers' blankets and felt hats are being followed up.

THE AGING OF RUBBER. If the rubber is not the predominant material in the mixture, then aging must be studied from the point of view of the deterioration of the yarn, fabric, or felt. The conversion of rubber in the yarn, for example, into resin, may not affect the properties of that yarn materially. This has yet to be established, but the use of rubber, resistant to aging conditions, is advisable under any circumstances. One fact has appeared from the results so far obtained, and that is that antioxidants are selective and specific for particular aging conditions.

[2] Research conducted at the Wool Industries Research Association, Torridon, Leeds, summarized to the end of 1936.

Rubber in Textiles

Work on this subject was almost wholly confined to an investigation into the factors responsible for aging in rubber treated fabrics. Experiments have included ordinary and vulcanizable latices including typical antioxidants used in the rubber industry. Some preliminary experiments have been made into combining latex with dispersions of chlorinated rubber and shellac. Further experiments were designed toward the production of an anti-crease finish with latex.

Rubber in Paints

Efforts have been concerned especially with the preparation of water and alkali resisting paints and particularly with the working out of the best method for the manufacture of a reaction product involving boron trifluoride. Tests have also been made on Rubbone hydrochloride produced in the rubber resins researches referred to below, and the ethyl hypochlorite product supplied by the Modified Rubbers Research Committee.

In cooperation with the association's Propaganda Committee some 130 firms of paint manufacturers were visited during the year, and in most cases samples of Solution B (a catalysed solution of rubber in white spirit) and paint were submitted to them. Some firms still carry out trials; others now use rubber in their products.

Resin Prepared from Rubber

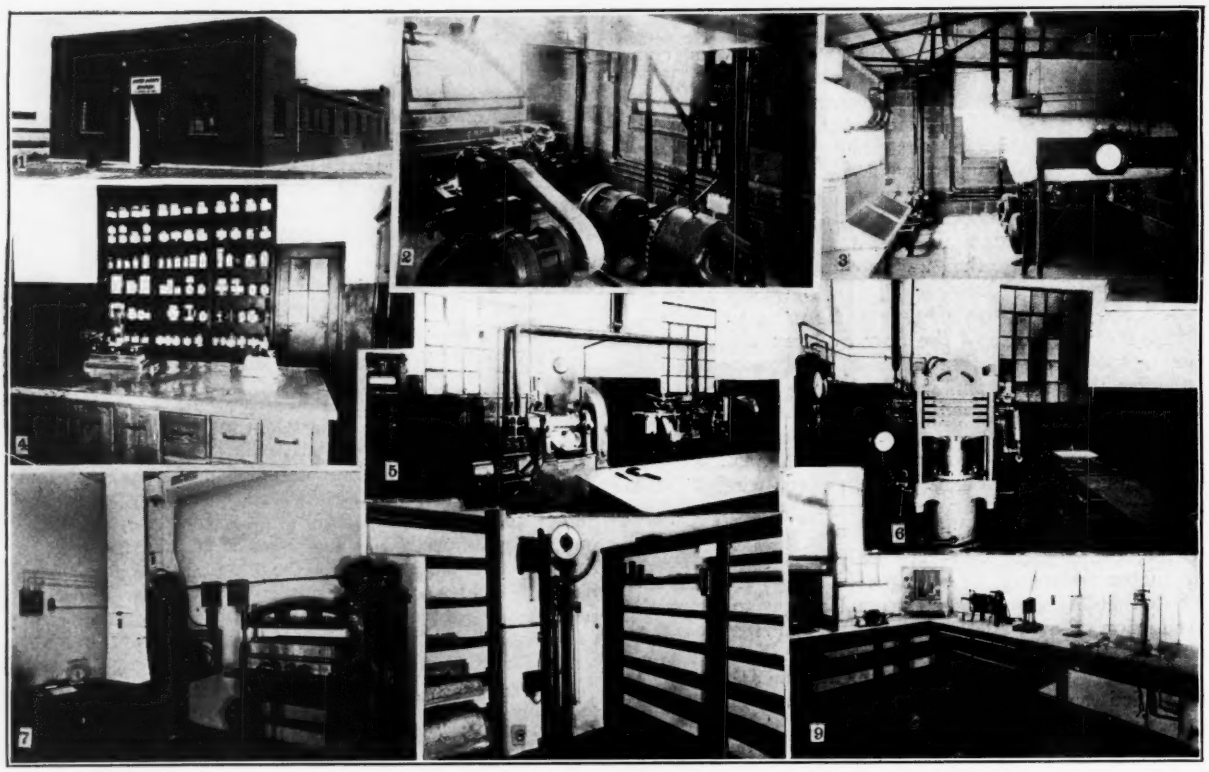
Continuing the work undertaken in 1935, large batches of molding powders were made by our consultants and were tested at the Metropolitan-Vickers laboratories and by Messrs. Thomson Houston. The results were not altogether promising, but recent improvements in the technique of resin production may make it possible to revert to this question later. During the year considerable quantities of Rubbone were manufactured, and the technique necessary to operate on a commercial scale appears now to be solved.

A great amount of work was done in the production of baking varnishes and tin lacquers. The varnish bakes to a fine golden yellow product, which is extremely flexible. Its moisture resisting properties are excellent, making it a desirable adjunct to the electrical industry. The technique for the production of Rubbone hydrochloride was explored since it appears to offer some promise as an alkali resistant varnish for protecting new plaster and concrete. The defects resultant on storage are being investigated.

Crumb and Powder Rubbers

Reference was made in the last report to rubber road surfacing materials involving the use of nitrite crumb rubber, being under preliminary trial. The stretch of roadway incorporating a carpet-mixture devised by the London Advisory Committee staff continues to give satisfactory results, and the committee made arrangements with the Limmer & Trinidad Lake Asphalt Co. for closer laboratory cooperation and further large-scale trials. The joint laboratory work has indicated that it is not necessary to dissolve crumb rubber in the bitumen, and a new method of incorporating latex has been evolved. This facilitates the process, though less rubber is required to achieve the given effect. Laboratory tests have shown that rubber in various forms enhances the properties of asphalt/cement mixtures in respect of softening, ductility, elasticity, resistance of flow, etc., and there are indications that the carpets so prepared show a less tendency to flush-up on the road. Experimental work has been continued with the use of other forms of powder rubber and the preparation of modified products from them.

Technical Process Control of Carbon Black



Views of the United Carbon Co.'s New Laboratory at Borger, Tex.

Fig. 1. Central Control Laboratory. Fig. 2. Motor House, Showing Motor Generator Set, Air Compressor, and Air Conditioning Motor. Fig. 3. Another View of Motor House, Showing Air Conditioning System and Hot Water System for Controlling Temperature on Mill and Banbury. Fig. 4. Compounding Room. Fig. 5. Mill Room. Fig. 6. Press Room. Fig. 7. Constant Temperature Room, Showing Carrier Conditioning System and Clicking Machine. Fig. 8. Another Section of Constant Temperature Room, Showing Tensile Tester. Fig. 9. Rubber Testing Laboratory

SINCE the inception of carbon black as a commercial ingredient for rubber compounding 25 years ago, rapid strides have been made in quantity production methods and in technical development and control of the processes of manufacture. Coincidental with the growth into an industry in its own right, great advancements have been made in highly specialized technical research as to application and control of quality and uniformity of the products.

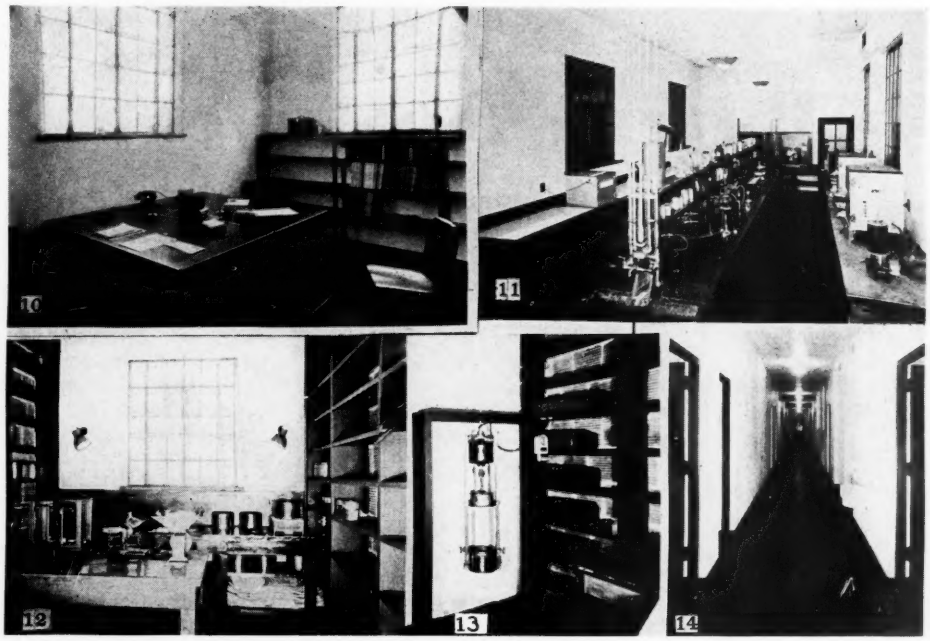
The importance of favorable technical facilities in the way of modern laboratory buildings and equipment is evidenced by the fact that the United Carbon Co., Charleston, W. Va., recently completed a central control laboratory in Borger, Tex., to service its numerous plants operating in that territory. This laboratory is to be used exclusively for control and process development work.

The one-story building on a solid concrete foundation, 50 by 100 feet, is of steel and brick construction with the inner walls of tile. The inside walls and ceilings are plastered, and the floors are coated and finished with a plastic. All doors and window frames are of steel, thus completely fireproofing the structure. Special insulated windows make the building dustproof.

The entire building is air conditioned. The constant temperature room has its own unit for maintaining and controlling both the temperature and relative humidity. Large windows and indirect lighting in the offices and individual laboratories provide proper lighting effects. The floor plan presents a center hall running directly through the building with the offices, laboratories, locker and stock rooms on both sides.

Entirely separate from the laboratory building is the boiler house, which also contains the motor generator set, air conditioning apparatus, air compressor, and other auxiliary equipment. All this equipment can be controlled from the relevant laboratories in the main building.

The rubber testing laboratories are on one side of the building, permitting a uniform flow of work from the time the samples are recorded in the stock room until the final results are compiled in the office.



Additional Glimpses of United Carbon's Central Control Laboratory

Fig. 10. An Office. Fig. 11. Color Testing and Chemical Laboratory. Fig. 12. Grit Testing Laboratory. Fig. 13. Dry Sifting Test Apparatus in Grit Testing Laboratory. Fig. 14. Center Hall in Central Control Laboratory Building

The rubber - black stock room at the rear of the laboratory contains ample shelf room for the storage of samples. The connecting compounding room has in the center a large zinc-top table with drawers and bins for compounding ingredients. Rubber is stored in suitable cupboards along one wall. Torsion balances are used for weighing the compounding ingredients.

The mill room, also connected with the compounding room, is equipped with the latest type of laboratory mill and Model B Banbury, both of which are driven by D.C. motors to give variable speed and are equipped with systems for accurate temperature control. Kilowatt meters have been connected to both the mill and Banbury for recording power imput. Mixing temperatures in the Banbury are recorded on a recording potentiometer through a thermocouple arrangement. A long steel table is placed directly in front of the mill and Banbury.

The press room adjoins the mill room with a connecting door and is used exclusively for curing test samples. A four-opening daylight press has been installed, having an automatic pump connection for raising the pressure. The press is also equipped for accurate temperature control with modern temperature regulators.

The constant temperature room is entered from the main hall and adjoins the press room. Aging of rubber stocks and testing for stress-strain properties are conducted in this insulated room under constant temperature and relative humidity conditions. A clicking (or dinking) machine has been installed for the dieing out of test pieces.

The second rubber testing laboratory adjoins the constant temperature room and is entered from the main hallway. This laboratory, also held at a constant temperature, is quite large and contains apparatus and equipment for testing the state of cure (T-50 Test), resistance to abrasion, plasticity, etc., of rubber stocks under uniform conditions. An office adjoins the second rubber testing laboratory.

Directly opposite the rubber testing section are offices and analytical laboratories as described below. At the front end of the building is an office and adjoining are the locker and shower rooms. The locker room is equipped with large individual steel lockers for the convenience of the staff.

Next in line is a large laboratory, the facilities of which are utilized for testing color grades of carbon black, chemical analysis, and microscopical work. This laboratory is equipped with analytical balances, constant temperature ovens, Hoskin and Fieldner type furnaces, fume hood, etc., and in the center of the room is a bench with shelves and a center drain. In one corner is a dark room. Adjoining the color testing and chemical laboratory is the stock room for storage of samples.

In the grit testing laboratory, entered from the main hall, the products from each plant and unit are closely controlled through regular grit tests and dry sifting tests. Shelves have been built on two sides of the room for the samples received for testing purposes.

Adjacent to the grit testing laboratory is a large general work room, containing a work bench and in one corner, a well constructed bomb room equipped with a Bierer-Davis type of constant temperature bath and bomb for the accelerated aging of rubber stocks.

The new laboratory which went into full operation on June 1, 1937, has a scientifically trained staff of nine chemists and chemical engineers.

In addition to this central control laboratory at Borger, the United Carbon Co. has a research laboratory and a separate development laboratory,[1] both of which are in Charleston, W. Va. Besides the three master laboratories, the company maintains and operates two smaller control laboratories at two of its plants.

The use of such extensive laboratories and technical staff as described above is evidence of the thorough consideration which is being given to a single, yet extremely important ingredient in present-day rubber compounding.

[1] India Rubber World, Mar. 1, 1936, pp. 35-38.

Automobile tire exports from the United States the first four months of 1937, against the same period of 1936, increased 13.8% in quantity and 22.5 in value: 300,221 casings, value $3,283,877, and 341,736 at $4,154,-154. Less truck and bus casings were exported in the 1937 period, but exports of other automobile casings increased to bring the total well above that at this time last year.

Patent Abstracts

Latex in Upholstery and Rug Fabrics

THE descriptions of latex application as taken from classified recent patents are interrelated and show that considerable development effort is being extended toward the use of latex in a relatively new field now attracting wide interest.

Porous Latex Backing for Rugs[1]

A process of producing a floor covering comprises a fibrous layer and a resilient rubber layer secured directly to each other. A practical embodiment of a material made in accordance with this method is shown in Figure 1, in which the pile threads are denoted by 1, the warp threads by 2, the weft threads by 3, and the rubber layer by 4.

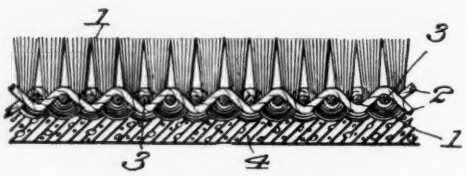


Fig. 1. Cross-Section of Backed Rug

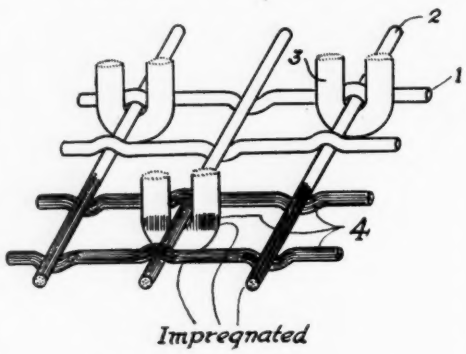


Fig. 2. V-Pile Fabric Construction

Compound

A specific example of a satisfactory formula showing the character of mixture used is as follows:

	Parts by Weight
Concentrated latex (75% solids)	133.0
Precipitated sulphur	2.0
Zinc oxide	7.0
Antioxidant	1.0 to 1.5
Accelerator	1.0 to 1.5
Penetrating agent	0.06
Precipitated chalk	30.0 to 50.0
Stabilizer	0.0 to 0.5
Water	5.0 to 18.0

Application

The compound is applied to the back of the finished pile fabric with a doctor blade, which may be set at a predetermined height to obtain the desired thickness on the back of the fabric. After application of the compound, the material is promptly led into a heated chamber, which has a temperature above the boiling point of water. The effect of this heat upon the water constituent of the compound is to cause it to boil, imparting a somewhat cellular quality to the rubber. Also drying and vulcanization take place in this same chamber in connection with the above vaporization.

Process Features

It will be observed that this invention does not require the employment of added chemicals for the generation of gas, but that it relies upon the boiling of the water present in the mixture in which the rubber is dispersed for the purpose of imparting the bubbly or cellular characteristic to the rubber. It will be noted particularly that this method does not contemplate the production of a separate layer of rubber which is then secured to the fabric, but the rubber mixture is applied directly to the fabric, and its vulcanization and cellular characteristics are brought about after application. The compound set forth may be spread in a thickness of approximately 0.03-inch, and such a coating will be completely dried and cured if allowed to remain in the drier 45 minutes at 250° F.

This method is very simple and inexpensive, and the material produced is desirable for use as a floor covering and the like, particularly from the viewpoints of durability, resiliency, and non-slipping.

Porous Coated Pile Fabric[2]

This invention consists of an improved V-pile fabric in which the loops of the pile are firmly united to a backing fabric by an insoluble pliable composition, such as a rubber latex compound, which is so positioned in the fabric that the original and often desirable porosity or ventilating quality of the fabric is largely retained.

Method of Binding

In this invention the binder is not continuous, but is largely confined to the threads at their points of interlacing rather than in the interstices between the threads. In comparable textures of woven webs anchorage of the pile tufts is claimed to equal that obtained with a continuous film, but with much less rubber.

Figure 2, a diagrammatic view of the fabric, illustrates the localizing of the impregnating matter about a single pile loop. The fabrics are made up of backing warps 1, backing wefts 2, and pile loops 3, respectively. Reference numeral 4 designates the anchoring material diffused throughout the length of the backing yarns and localized in the tufts so as to leave the interstices of the back substantially free of anchoring material. This allows for a rocking action of the pile loop about its supporting weft. It is to be understood that the fabric must be woven tightly enough in order to provide good pile coverage on its face.

This process does not depend on the particular binding material used, although it has been found that aqueous dispersions of rubber containing vulcanizing substances or aqueous dispersions of nitrocellulose, preferably in colloidal forms, are effective after the woven web has been prepared as indicated above.

The porosity obtained is desirable, for example, in fabrics used for automobile cushions. Objectionable air pockets are prevented and ventilation is permitted, thus avoiding heat accumulation.

[1] United States patent No 2,069,753, Feb. 9, 1937.
[2] U. S. patent No. 2,070,335, Feb. 9, 1937.

Pretreatment of Fabric

The fabric is prepared by scouring it locally first. This is accomplished by applying substances to the back of the woven web, which will remove the water-repellent oils from the threads and this, together with the moisture left in the fabric as a result of the scouring, causes the threads to have a greater affinity for the binder material than do the interstices between the threads; hence the interstices will not be closed unless an excessive amount of binder material is applied.

A section or blower apparatus may be used to blow or draw off surplus water, which may be left on the fabric as a result of the scouring. This latter step regulates the amount of water in the fibers and removes water from the interstices between the tufts and threads. The amount of local scouring, moisture content of the fabric, and the viscosity of the binder fluid when applied are all contributing factors to the positioning of the binder material.

Latex Compounds for Fabric[3]

Latex compounds are produced having high viscosities at relatively low solids content without a large amount of inert fillers.

Such compounds are particularly applicable to pile fabrics for securing the pile tufts in a loosely woven base. In the production of such fabrics it is essential that the coating sol have sufficient viscosity to avoid permeation through the loosely woven mat to the face of the fabric, and it is also desirable that the coating sol have a low concentration of solids so as to form a thin flexible film.

Thickening Agents

The thickeners found suitable for this purpose are polysaccharids containing or decomposable into a uronic acid. Best results are obtained by using white, odorless, tasteless powders derived from vegetable gums and having the characteristics of carob-seed derivatives. All these gums may be identified primarily by the gelling action of borax on their solutions.

By the use of the foregoing substances in amounts as low as 1½% of the rubber solids in the case of vegetable gums having the characteristics of carob-seed derivatives, the viscosity of latex can be controlled for spreading, dipping, spraying, and other purposes without substantially altering the desirable properties of unmodified latex. The viscosity will be comparable to that resulting from the addition of about 67% of gum arabic or 125% of dextrine. The use of such small quantities of viscosifiers as described avoids the deterioration resulting from the use of large quantities of common thickeners which decreases the tensile strength, aging, elasticity, and cohesion of the rubber and leaves a porous and discontinuous film if washed out of the solidified film.

Example of Compounding

As an illustration of a preferred practice, slowly stirred into 286 grams of latex from *Hevea brasiliensis* (35% solids) are 214 grams of 0.7% solution of carob-seed derivative so that there is added an amount of gum equal to about 1½% by weight of the rubber solids in the latex. The addition of this aqueous solution so dilutes the sol as to decrease the rubber colloid from 35% to about 20%, by weight, in the compound, and the viscosity of the compound is increased from about 43 seconds on a Saybolt viscosimeter to about 280 seconds at 23° C. Preferably the aqueous solution, containing the viscosifying agent, also should contain a base, such as ammonia or alkali metal hydroxide, and it may contain vulcanizing, accelerating, and antioxidizing substances, or these materials may be added to the latex or to the final mixture.

The coatings are solidified and the rubber vulcanized preferably in an enclosed drier at comparatively low temperatures. If the pile is subsequently dyed with hot acid dye, any free viscosifying material will be hydrolized and removed, leaving a thin film securely anchoring the pile.

[3] U. S. patent No. 2,065,937.

Dispersers and Softeners

(*Continued from page* 51)

TABLE 8

Softener (Volume % on Rubber)	5 Plasticity	10 Plasticity	20 Plasticity	30 Plasticity
Mineral Rubber	65.5	75	75	77.5

terial (mineral rubber) is frequently used in larger dosages than the other softeners, the plasticizing effect of larger quantities up to 30% was tested. The results are given in Table 8, from which can be seen that the increase is very gradual and is far from reaching the values of Reogen or rosin oil. The observation in actual practice that mineral rubber is a softener is therefore correct, but there are other materials far superior to it in this respect. These tests, of course, were made on only one grade, this having a softening point of about 160° C., and it is quite possible that lower melting bitumens may show higher plasticity values. Such data would probably not be of much interest to the rubber industry, however, since the above-mentioned mineral rubber is the one most used.

(*To be continued*)

Mastication

(*Continued from page* 41)

Other methods for producing rubber powders have been the grinding of latex coagulum in a manner similar to that employed for vulcanized scrap rubber.[9] From the same source came the method of adding sodium nitrate to latex prior to treatment.

Yet another process developed by Noble[10] in the U.S.A. was to flocculate latex and then dry the rubber flocks to get a fairly fine powder.

The development of rubber powder processes has been reviewed by Dawson.[11]

The principle difficulty in employing rubber powder is that when fine fillers are mixed with it, the rubber does not appear to flow sufficiently well during vulcanization to produce goods having any degree of homogeneity. The tensile properties are impaired, and the products do not compare favorably with those made by the standard process. The results resemble to some extent those obtained by compounding latex.

Conclusion

The desire to get away from the processes of mastication is quite unmistakable. That many of the products mentioned are already on the market is a sign that progress is being made. A new technique is needed to secure novel applications for large quantities of rubber since mastication has been the greatest drawback to previous attempts. With continued research and investigation it would appear possible to replace present-day compounding methods within a few years. This accomplishment would greatly benefit rubber growers and the rubber industry in general. The slogan should be "Free Us from the Slavery of Mastication!"

[9] Martin, B.P. 395,775.
[10] U. S. patent No. 2,019,055.
[11] *Bull. Rubber Growers' Assocn.*, Apr., 1936, p. 153.

Editorials

Rubber Restriction Renewal

THE existing agreement under which the restriction of crude rubber shipments has been functioning will be terminated on December 31, 1938. Already considerable comment has been originating as to the desirability of renewing the principle of restriction and the feasibility of altering various phases of structural organization of the committee and the functional methods under which the plan is administered.

Sir Shenton Thomas, high commissioner of the Malay States recently said, "Cheap rubber is the best insurance against the effects of slump conditions and the surest way of promoting new uses and expanding markets. As for restriction, it is not permanent. It may last for some time, but being artificial, it must lack permanency."

In a recent article on "Rubber in Malaya," Eric Macfadyen indicated that full advantage had not been taken of the replanting permit up to 20% of the area under rubber on June 1, 1934, and with exportable allowances under 75% as in 1936 there had been room for considerable uprooting, but with the percentage of 90 the problem is difficult and large-scale uprooting might bring about a temporary shortage.

Comments of many men, presumably well informed, point generally to the desirability of a control, but also indicate a lack of universal satisfaction with the functioning of the present arrangement.

Any plan of organized control, in order to be perpetuated as successful, must insure an ample supply to the consumer and a sizable reserve stock as well as restrict excess shipments and it must give due consideration to all parties affected by the relative supply and demand. In other words, it must be administered with complete knowledge as to supply and demand, foresight several years ahead, and with impartial justice to producer and consumer alike.

True, this is a huge objective, but certainly, intensive well-organized consideration is warranted for the control of a business involving 1,000,000 tons or more per year with such ramifications as planting six years before harvesting, the requirement of non-resident labor, a large number of producing countries, numerous markets in non-producing countries, and the necessary lapse of time from producer to consumer. An undertaking of this magnitude requires that the control committee be fully representative of all parties affected so as to be well informed as to future relative conditions and that the producers, having been advised well in advance, will honor their obligations both as to restriction and production to the full extent of their permissible quotas.

Hours and Earnings

WITH respect to average hourly and weekly earnings and average hours per week per wage earner, the rubber industry as a whole presents at this time conditions which are much improved over those in the highest earnings period during the past 23 years.

On page 74 of this issue are published statistics compiled by the National Industrial Conference Board, covering all rubber manufacturing for 1914, by years for the period from 1920 to 1936 inclusive and by months for 1937 including May.

In May, 1937, the average hourly earnings of $.86 and average weekly earnings of $30.10 with a 35-hour average week are the highest recorded during the period and compare with the previous high average weekly earnings of $29.99 in 1927 when the average hourly earnings were only $.66 and the average week was 45.4 hours. With 1914 conditions considered at 100% the May, 1937, statistics show average hourly earnings at 344% and average weekly earnings at 245% with the average hours per week per wage earner reduced to 71%.

The general present-day trend is very commendable and places the industry in an enviable position as regards the chronologically relative income of the wage earner.

Activity

DR. CHARLES F. KETTERING, inventor of the electric self-starter, once said "Unintelligent motion is a great deal more important in research than intelligent standing still."

Many important discoveries are the result of accidents in research, but they are always the result of activity even though in some cases there may be very little advance knowledge as to the results that can be expected.

This principle applies equally in research, production, or business administration. It has been said that he who does nothing, never makes any mistakes: likewise he never accomplishes anything. Activity and a determination to accomplish the objective will produce results eventually. With Charles Goodyear this was almost an obsession. The law of averages will prevail in the long run, and if many attempts are made, a portion of them will be successful. Even though the result may be negative, completed action will produce some worthwhile information.

EDITOR

What the Rubber Chemists Are Doing

A.S.T.M. Meeting

THE fortieth annual meeting of the American Society for Testing Materials and the fourth Exhibit of Testing Apparatus and Related Equipment were held at the Waldorf Astoria Hotel in New York, N. Y., from June 28 to July 2, with a record attendance of 1,525. The 1938 annual meeting is to be held at Atlantic City, N. J., and the 1938 regional committees will convene at Rochester, N. Y., during the week of March 7. It is expected that the technical feature of the regional meeting will be a symposium on plastics.

At the meeting just held over 100 technical papers and committee reports were presented and 52 proposed specifications and tests were accepted as tentative, an indication of the recent activity of the Society.

New Committees

Three new committees were organized: C-14 on Glass and Glass Products; D-6 on Paper and Paper Products; and D-20 on Plastics.

Marburg Lecture

The large attendance at the Edgar Marburg Lecture on "Plastics: Some Applications of the Different Classes, Methods of Testing," by Dr. T. Smith Taylor, of Washington and Jefferson College, indicated the great interest shown in this newer engineering material.

Symposium on Consistency

An outstanding feature of the meeting was the technical symposium on "Consistency: Critical Discussion on Present-day Practices in Consistency Measurement." A paper on the subject "Consistency Measurement of Rubber and Rubber Compounds," was prepared by J. H. Dillon and L. V. Cooper, both of Firestone Tire & Rubber Co. The nature of the rheological problem for rubber was discussed. Various instruments used in testing rheological properties were described and classified according to the requirements of an ideal testing instrument. The necessity of continuing to use empirical devices was shown, but further development of absolute methods was urged.

Melvin Mooney, United States Rubber Products, Inc., gave a paper on "Definition of Consistency and theoretical Considerations." He suggested that tests should either be thoroughly practical in reference to service conditions or should be thoroughly scientific from a rheological standpoint.

Committee D-11 on Rubber Products

NEW MEMBERS. O. M. Hayden, of E. I. du Pont de Nemours & Co., Inc., chairman, reported that new members added to the committee during the year included: Alfred Bellis, John A. Roebling's Sons Co.; D. E. Baker, Monsanto Chemical Co.; H. S. Karch, Lima Cord Sole & Heel Co.; W. H. Reynolds, American Instrument Co.; B. J. Barmak, Commonwealth Edison Co.; and A. W. Staller, Crescent Insulated Wire & Cable Co.

Additional company representatives have been added as follows: David C. Scott, Jr., Henry L. Scott Co.; M. G. Shepard, U.S. Rubber Co.; R. V. Yohe, The B. F. Goodrich Co. Representation of the National Electrical Manufacturers Association has been changed by the designation of E. D. Youmans as principal in place of C. R. Boggs, and by the addition of E. W. Schwartz.

NEW SUBCOMMITTEES. Two new subcommittees were authorized at the meeting: one on Test Methods for Sponge Rubber, and the other on Test Methods for Hard Rubber. Organization is expected by early fall.

SUBCOMMITTEE I ON MECHANICAL RUBBER HOSE has decided to consolidate and amplify the two Standards, D379 and D380, on testing rubber hose.

SUBCOMMITTEE IV ON PROTECTION OF PERSONS FROM ELECTRICAL SHOCK expects to recommend revisions in the Standard Specifications for Rubber Gloves (D120) in order to bring them up to date.

SUBCOMMITTEE V ON INSULATED WIRE AND CABLES has been preparing specifications covering tough rubber jacket compounds for cables and for heat-resisting compounds. It is expected that final recommendations will be available in the near future.

SUBCOMMITTEE VI ON PACKINGS, GASKETS, AND PUMP VALVES has been organized and expects to start work soon. William Staniar, du Pont, has been appointed chairman.

SUBCOMMITTEE XIV ON ABRASION TESTS FOR RUBBER PRODUCTS reported substantial progress on the project of developing standard specimens having certified physical properties. It appears possible that check results can be obtained in various laboratories using a standard rubber test specimen of a quality similar to that of a high-grade tire tread stock. This is important because it may provide a means for different laboratories to calibrate their test machines and test methods by reference to accepted standards.

SUBCOMMITTEE XIX ON TESTS FOR PROPERTIES OF RUBBER AND RUBBER-LIKE MATERIALS IN LIQUIDS has agreed on details for a standard method of test for resistance of rubber and rubber-like materials to the action of solvents.

SUBCOMMITTEE XXI ON TESTS OF LIQUID RUBBER PRODUCTS, recently organized, has been devoting its attention to the formulation of standard methods of test for the evaluation of rubber cements and rubber latex.

NEW STANDARDS. The following proposed tentative standard was approved by the committee D-11.

"Tentative Method for Air Pressure Heat Test of Vulcanized Rubber." This method, an accelerated life test for heat-resistant rubber compounds, consists of measuring the physical properties of the compound in question before and after subjecting it to the deteriorating influence of air at elevated temperature and pressure.

Revisions were approved in "Tentative Methods of Test for Abrasion Resistance of Rubber Compounds (D394)" and "Tentative Methods of Test for Compression Set of Vulcanized Rubber (D395)."

"Tentative specifications for Insulated Wire and Cable: Class A0, 30% Hevea Rubber Compound (D27)" and "Performance Rubber Compound (D353)" were revised and approved. "Tentative specifications for Insulated Wire and Cable: Class A, 30% Hevea Rubber Compound (D393)" have been withdrawn as this compound is now obsolete.

It was decided that the "Tentative Specifications for Rubber Pump Valves (D151)" should be continued as tentative for the present, pending changes that are in order.

Committee D-13 on Textiles

TIRE FABRICS. Chairman H. J. Ball, reports consolidation (New D122 Standard) of three existing standards: "Methods of Testing and Tolerances for Tire Fabrics Other than Cord Fabrics (D122); "Specifications and Methods of Test for Chafer Tire Fabrics (D316);" and "Specifications and Methods of Test for Enameling Duck

for the Tire Industry (D336)." This consolidation involved no change in substance of these three standards.

Machine Exhibit

A large exhibition of testing and control equipment indicated the advancements that have been made in an effort to aid technical work in conjunction with manufacturing. Of particular interest to the rubber industry were machines for tensile and flexing tests on fabric and rubber, aging apparatus, abrasion machines used at present on carpets, electrical process control instruments, and vibration indicators.

Society of Rheology Meeting

THE ninth annual meeting of the Society of Rheology will be held in Akron, O., October 22 and 23, 1937, with headquarters at the Hotel Mayflower.

A member society of the American Institute of Physics, the Society of Rheology is a relatively small group concerning itself with the flow of matter under stress. Specific properties studied include viscosity, plasticity, consistency, elasticity, and others of like nature. These properties are of great interest to a wide variety of industries since many products depend for their perfection upon flow characteristics, as well as to those in academic research since many fundamental concepts can be based upon observed stress-flow relations.

The program of papers is now in preparation. Titles and abstracts (not more than 300 words) should be submitted not later than September 15, to the program chairman, H. R. Lillie, in care of Corning Glass Works, Corning, N. Y.

Chemical Industries Show

THE Sixteenth Exposition of Chemical industries will be held at Grand Central Palace, New York, N. Y., from December 6 to 11, 1937. Three floors have been reserved, and at present approximately 75% of the space has been sold to exhibitors.

A number of exhibits will feature synthetic plastics and molded products as well as lacquers, varnishes, and corrosion resisting surface coatings

Among the sections at the exposition will be chemicals and chemical products, laboratory equipment and supplies, instruments of precision, containers and packaging materials, handling equipment, and industrial chemical equipment and machinery.

Dr. M. C. Whitaker, vice president of the American Cyanamid & Chemical Corp., Rockefeller Plaza, N. Y., will be chairman of the advisory committee for this exposition.

A. C. S. Activities

Rochester Meeting

AT THE ninety-fourth meeting of American Chemical Society being held in Rochester, N. Y., from September 6 to 10, in addition to the Rubber Division program on September 9 and 10 there will be other activities which will interest some of the rubber industry members. Seventeen professional divisions of the Society and the Microchemical Section have scheduled sessions. The National Research Council's Insulation Committee will join with the Division in a symposium on the chemistry and physics of electrical insulation. A total of 23 symposia will be held. Chemical microscopy, quantitative spectroscopic analysis and photography will be among the session topics of the Division of Physical and Inorganic Chemistry.

The Industrial and Engineering Chemistry Division will hold half-day symposia on "unit processes" and "automatic control."

The Cellulose Division will emphasize research on cellulose derivatives; while the Paint and Varnish Division will feature organic plastics. Among other subjects papers will deal with problems in fuel rating, water, microchemistry, organic chemistry and colloids.

M. H. Eisenhart, president of the Bausch & Lomb Optical Co. is general chairman of the meeting. All-day trips to the Corning Glass Works, Taylor Wine Co. and Pleasant Valley Wine Co. have been arranged. Also, industrial laboratories in Rochester, including those of the Eastman Kodak Co. and Bausch & Lomb, may be visited during the session.

The Taylor Instrument Cos., manufacturer of unit and automatic control instruments for the rubber industry, is located in Rochester and undoubtedly a number of chemists will desire to visit this plant.

Dr. E. R. Weidlein, director of the Mellon Institute of Industrial Research, Pittsburgh, Pa., will deliver the annual presidential address of the society on Tuesday evening. On Wednesday, September 8, the society as a whole will convene in the Eastman Theater to be addressed by three prominent scientists.

The Hotel Seneca has been selected as general headquarters for the society, and the Powers Hotel will be the headquarters of the Rubber Division. Other hotels in Rochester are the Cadillac, Hayward, Ford, and Rochester.

Chicago Group

THE Chicago Group, Rubber Division, A.C.S., has made plans to resume meetings during the Fall season and its next gathering will be on September 24 at the Hotel Sherman. At a recent executive meeting arrangements were completed for programs through February, 1938. The Hotel Sherman, College Inn, will continue to be headquarters.

For the September meeting George H. Ellinwood, of Johns-Manville, Waukegan, Ill., will act as chairman, and he is arranging a very interesting program. It is reported that the 1937-38 meetings will be different in many respects from those previously presented.

Because of address changes during the past year the Chicago Group requests that members not receiving notices should send their address to B. W. Lewis, secretary, Chicago Rubber Group, in care of Wishnick-Tumpeer, Inc., Tribune Tower, 435 North Michigan Ave., Chicago, Ill.

Los Angeles Group Fishing Trip

SUNDAY, August 8, the Los Angeles Group, Rubber Division, A. C. S., will enjoy the second annual outing for deep-sea fishing. The *Star Angler,* chartered for the trip, is a 65-foot high-speed boat with twin-Diesel engines and affords excellent accommodations. Fishing tackle will be provided at no additional cost, but those who have their own personal equipment are welcome to bring it along. The party, limited to 40 members, will start from San Diego about 4:00 a.m. Numerous valuable prizes will be awarded to those exhibiting unusual skill in landing their catch. Motion pictures of the activities will be taken during the trip.

As the cost will exceed the reservation fee of $5, a raffle is being conducted, and a complete fishing outfit or $25 in cash will be awarded the winner. Reservations may be made by sending a check to E. L. Royal, program chairman, 4814 Loma Vista Ave., Los Angeles, Calif.

Boston Group

THE first annual outing of the Boston Group, Rubber Division, A.C.S., will be held Friday, August 13, at "Fieldston" in Marshfield, Mass. The Marshfield Country Club, one of the finest in the state, has been reserved at a special greens fee of $1. Golfers may tee off any time after 1:30 p.m. and should go directly to the club house, three miles from "Fieldston."

At "Fieldston" the non-golfers will witness a baseball game, starting at 3 o'clock sharp, between the Boston Group and the Rhode Island Rubber Club. (Rumors are that the Providence boys have been practicing every night for a month.)

Surf bathing is excellent on the private beach, and a large salt water pool is also available. Other outdoor and

(*Continued on page* 81)

Editor's Book Table

NEW PUBLICATIONS

"Bulletin on Round-Chart Potentiometer Pyrometer Controllers." The Bristol Co., Waterbury, Conn. A 12-page bulletin describes the potentiometer pyrometers recently developed by The Bristol Co. Special features in construction and operation made possible by application of a simplified principle are presented. These instruments are available as temperature recorders and controllers, with either pneumatic or electrical operation.

"Neoprene." E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This 24-page handbook presents the basic properties of Neoprene with definite consideration to the effects of acids, sunlight, heat, and various types of oils. Comparison is also made between the serviceability of Neoprene and rubber under these deteriorating influences. Many specific applications and substitutions are described with reasons for the use of Neoprene. These applications include hose, electrical cable, molded parts, extruded material, sheet goods, and gaskets. A summary of the method of making Neoprene and a short history of its development complete the booklet.

"Morisons' Monthly Review." H. Morison & Co. May-June, 1937. 56 pages. This issue reviews recent trends in British industry. Current political and economic developments that have a bearing on the industrial markets are discussed. Statistical tables and general information concerning the rubber market are thoroughly dealt with in this issue.

"Supplement to List of Inspected Gas, Oil, and Miscellaneous Appliances." Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. This 24-page supplement contains listings of appliances established subsequent to the publication of the December, 1936, list. Page 7 lists rubber and synthetic rubber hose manufacturers with brief general descriptions of their products and their identification markings.

"Review of Canada's Trade in the Calendar Year 1936." Dominion Bureau of Statistics, Ottawa, Canada. This report deals with Canada's foreign trade and world trade in 1936. Included are sections on Canada's trade with the United Kingdom, the United States, and 27 other countries. It also covers principal Canadian imports and exports. Copies may be obtained from the Dominion Bureau of Statistics for 25¢.

"The Vanderbilt News." Vol. VII, No. 7, July-August, 1937. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 24 pages. Devoted exclusively to reclaimed rubber compounds, this issue points out a number of advantages of using reclaim for certain specific purposes. The use of accelerators, antioxidants, and other compounding ingredients with reclaimed rubber compounds is discussed. Seventeen pages of tables and graphs deal with the effect of reclaim on the physical properties of compounds for definite uses.

"Sources of Current Trade Statistics." United States Bureau of Foreign and Domestic Commerce, Washington, D. C. Price 25¢. This 47-page directory is a bibliographical reference listing approximately 3,000 series of current trade statistical reports published by 40 governmental and 200 nongovernmental agencies. The statistics listed cover production, new orders, unfilled orders, consumption, stocks, wholesale and retail prices, employment, and earnings. Among the numerous commodities included are textiles, chemicals, rubber, leather, machinery, and transportation equipment. Other items covered are electric power and gas, finance, trade, transportation, and communications. This publication is valuable as a basic source reference to those interested in current business and economic developments.

"Monastral Fast Blue BS." E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., 20 pages. In this booklet are described the uses of Monastral Fast Blue BS in rubber, paint, paper, textiles, and printing inks. The properties of the pigment are given as well as the various types available. Several samples showing the application of the new blue shades are included in the booklet. One section is devoted to the stability and behavior of Monastral Blue in rubber compounds.

"List of Publications of the Department of Commerce." Division of Publications, Department of Commerce, Washington, D. C. This 142-page booklet, issued annually, has more than 100 pages devoted to lists of publications of the National Bureau of Standards, the Bureau of Foreign and Domestic Commerce, and the Bureau of Census. The remainder of the pamphlet lists the publications of the other bureaus of the department. This listing includes several publications which have more or less bearing on the rubber industry.

"Robertson Reminders." Vol. V, No. 2, Independence Day Issue, 1937. John Robertson Co., Inc., 121-35 Water St., Brooklyn, N. Y. An interesting summary of recent tests on lead sheath and a few microphotographs showing the effect of inclusions in the lead are presented in this 16-page booklet. An explanation of the cause of defects in sheath is given with suggestions for a remedy.

"The Futility of Federal Wage and Hour Regulation." Booklet—Editorial No. 21 by Allen W. Rucker in collaboration with N. W. Pickering, president of Farrel-Birmingham Co., Inc., Ansonia, Conn. This 16-page pamphlet contains an analysis of the proposed Black-Connery Wage and Hour Bill. This booklet states that since 1920 manufacturing wage disbursements in the United States have not exceeded total farm income and that this fact suggests that farm income is the limiting factor in industrial payrolls. This discussion also declares that the Black-Connery Bill, based on the assumption that total annual payrolls of American enterprise can be enlarged by fiat, will have one of two destructive effects: (1) it will compel a scaling down of wage differentials; or (2) it will result in a further shrinkage of employment both in man-hours and in number of workers. Statistics and graphs are presented as a basis for the conclusions as set forth in this booklet.

"Monsanto Current Events." Vol. XVI, No. 3, June, 1937. Monsanto Chemical Co., St. Louis, Mo. The June issue of this house organ features several historical articles of interest. One paper vividly describes the rapid development of the American chemical industry during the past 20 years. Illustrated by numerous charts, the article records the basic factors which stimulated such an amazing growth. An article on Joseph Priestley, discoverer of oxygen, is the fourth of a series on outstanding chemists of the past. The new addition to the Thomas & Hochwalt Laboratories, Dayton, O., is described with illustrations.

"Truck, Bus, and Tractor Operators Handbook." 1937 Edition. The B. F. Goodrich Co., Akron, O. 68 pages. This booklet contains descriptive facts and specification tables on Goodrich tires for commercial service. The Goodrich Calculator for determining truck tire costs is described. A chapter on "Load Ratings and Inflation Pressures" discusses the maximum load

which can be carried by a tire under various operating conditions. Three pages at the end are devoted to weights and measures of materials not related to rubber goods.

"The Census of Manufactures—1935. The Rubber Industries." United States Department of Commerce, Bureau of the Census, Washington, D. C. This 12-page pamphlet presents in tabular form a comprehensive statistical survey of rubber manufacturing in this country for the years 1929, 1931, 1933, and 1935. The phases of manufacturing covered include cost of materials, etc., value of products, value added by manufacture, i.e., addition to the value of the basic commodities used, and wages. For statistical purposes the industry is divided into three groups: namely, (1) Rubber Tires and Tubes, (2) Rubber Boots and Shoes, (3) All Other Rubber Goods. Statistics for certain states are omitted where the figures might disclose data for individual establishments.

"News about du Pont Rubber Chemicals." E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. A news letter of July 1, 1937, states that organic colors are being used in conjunction with inorganic pigments to obtain both the depth of shade of the mineral pigments and the brilliance of the organic colors. Included with this news letter were five reports:

(1) "Colored Rubber Running Boards." This three-page bulletin gives a basic formula and results of fading tests on this compound using nine different du Pont colors.

(2) "New Colors for Latex Products." Data on three pages discuss the limitations on the use of water soluble dyes as well as their advantages in stated applications.

(3) "Surface Treatment of Thin Dipped Goods." This two-page report discusses addition of accelerators in solution, antioxidants in powder form, and colors as liquids after the article has been formed. A type compound for dipped balloons is shown.

(4) "Non-Staining Stocks for Use with Duco and Dulux." This two-page bulletin tells how to compound a super-aging stock that will not stain white lacquer surfaces.

(5) "Du Pont Monastral Blues for Rubber." This two-page leaflet describes the properties and appearance of this new organic color as applied to rubber and latex.

"Hose Buyers Guide." Electric Hose & Rubber Co., Wilmington, Del. A 64-page loose-leaf catalog of this company's complete line of braided and molded hose contains a description of each brand and recommendations for its use. Tabular data with each description consist of size, weight, number of braids, and pressure recommendations. Construction and material features are included with the descriptions. The booklet is indexed according to purpose as well as type of hose.

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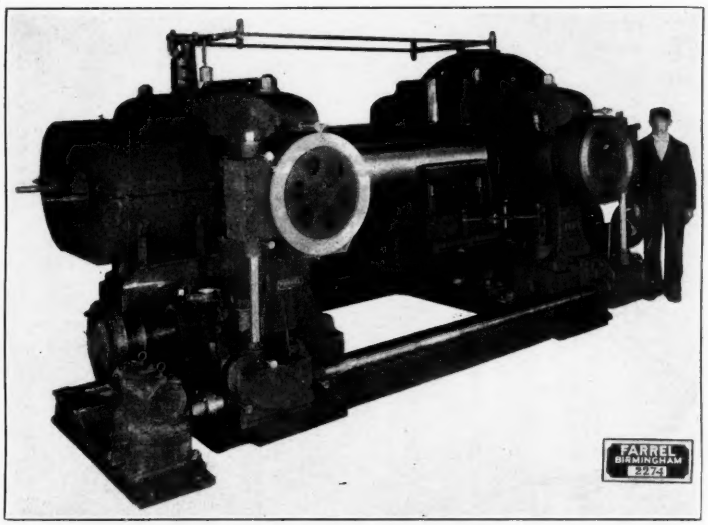
(*Continued on page 78*)

New Machines and Appliances



Farrel-Birmingham Sheeter

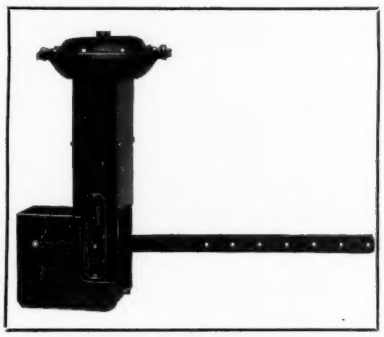
Rubber Sheeting Mill

SEVERAL new developments have been incorporated in an improved rubber sheeter. One of the special features is the motor driven adjustment by which the front roll is moved in and out. The adjusting screws are turned by means of a worm gear unit connected to an electric motor. A clutch permits the adjustment of the screws separately or collectively. A dial mounted in the head of the screw indicates the number of turns of the screw. Another feature is the strip cutting attachment which can be adjusted to cut a strip from 2 to 24 inches wide. This attachment is useful for cutting strips to feed tubing machines, strainers, calenders, etc.

The journal boxes in these mills are full bronze lined and water cooled. The chilled iron rolls are fitted for water circulation. The gears, fully enclosed for safety and providing bath lubrication, have cut spur teeth. Cast parts are made of Mechanite, an alloy cast iron of superior physical properties. Farrel-Birmingham Co., Inc., Ansonia, Conn.

Versatile Lever Motor

FOR conversion of pneumatic energy to linear or angular mechanical motion, the Motosteel Evenaction lever motor is recommended. It is applicable to the operation of dampers, lever operated valves, butterfly valves, and electrical rheostats for variable speed motors. It has an all-steel welded construction, a spring adjusting nut



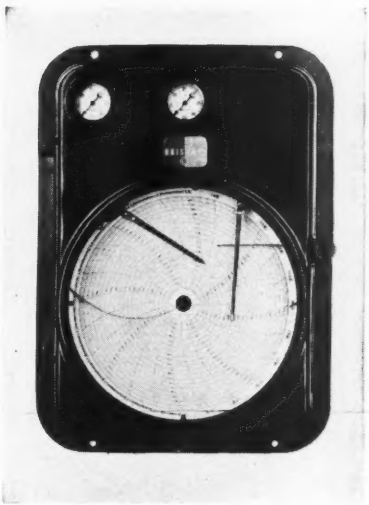
Motosteel Lever Motor

for increasing or decreasing the power of either stroke, limit stops for both strokes, and a deep diaphragm with large area.

Advantages claimed for this machine are precision operation, practical freedom from hysteresis and permanency of alinement. In reference to damper area, it is supplied in sizes of 25, 50, or 120 square feet. Operation may be by manual control or pneumatic equipment. Taylor Instrument Cos., Rochester, N. Y.

Potentiometer Pyrometer Controller

THE Pyromaster controller with a round chart is available in both pneumatic and electric types. It uses standard thermocouples and extension leads and is for direct ink-marking on a 12-inch chart or for indicating on a



Bristol Pyrometer Controller

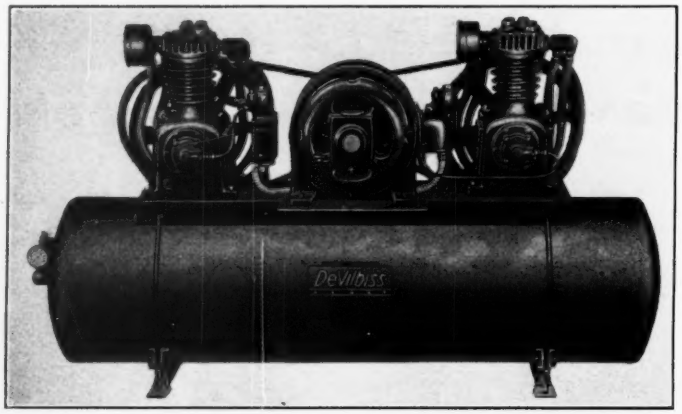
large scale. These controllers require no lubrication, are not affected by plant vibration, and employ no mechanical motion except when a change in the measured temperature takes place. These pyrometer controllers are automatically self-balancing and self-compensating for cold-end temperature changes.

The pen-arm is actuated in small steps that follow each other at a rate depending upon the rate of change in the temperature at the thermocouple, thus permitting immediate response to changes. This instrument is available as a recorder, or a recorder controller, with or without indicating scale. Bristol Co., Waterbury, Conn.

Air Compressor Unit

A NEW type of compressor is now available for small industrial plants whose compressed air requirements are beyond the capacity of the ordinary air cooled compressor, but not equal to that of the industrial water cooled type. Two compressors, each developing a maximum pressure of 200 pounds with the two-stage type or 150 pounds with the single stage, are mounted on opposite ends of the 20- by 60-inch air tank. Either a 7½ or 10 h.p. motor, located between the compressors, is available depending upon the pressure and volume of air required.

Each compressor has a V-belt drive, combination strainer and muffler, check valve, inter and after cooler, and centrifugal pressure release mechanism. Standard equipment includes pressure



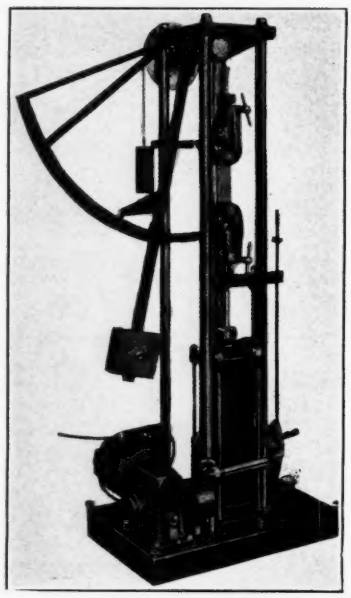
Air Compressor Assembly

gage, outlet, drain and safety valves, and automatic starting device. The DeVilbiss Co.

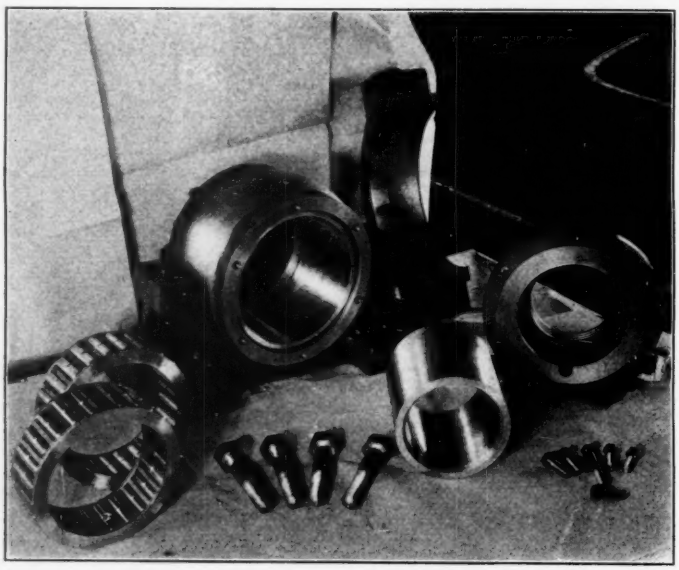
Pillow Block and Bearings

A SERIES of heavy-duty roller bearings has been developed to meet the severe service requirements of rubber and paper mill equipment. The large number of solid rollers and the sturdy construction of the cage tend to increase load capacity. These bearings are made in nearly 100 sizes with rated capacities ranging from 10,000 to 500,000 pounds.

Another development is a heavy-duty pillow block for roller bearings involving end thrust as well as radical load. Included in this assembly is a ball bearing which bears all the forces tending to displace the shaft axially. Self-alinement is provided by a spherical housing construction. The Fafnir Bearing Co.



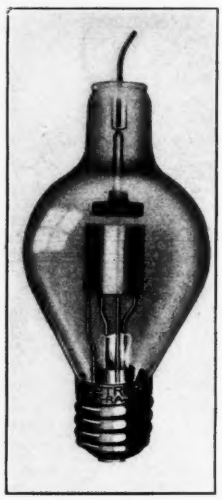
Electro-Hydraulic Tester



Disassembled Pillow Block

Low-Voltage Rectifier Tube

A NEW mercury vapor rectifier tube, known as type 2-RA-15, is designed for low-voltage applications such as projector arcs, arc welders, and similar equipment. It is 8½ inches long and has an overall diameter of 3¾ inches. Electrical characteristics are: filament voltage, 2.5 volts; filament current, 16 amperes; D.C. output (average), 15 amperes; D.C. output (crest), 45 amperes; arc drop, 5—8 volts; pickup voltage, 8—11 volts; D.C. output voltage, 60 volts maximum; crest inverse voltage, 200 volts maximum; filament heating time, 2 to 3 minutes. When this tube is used within the above limits, its life is guaranteed for 2,000 hours. Continental Electric Co.



Mercury Vapor Rectifier

Fabric Tensile Tester

THIS model 35-4 electro-hydraulic tester, suitable for bench or pedestal mounting, has four-post supporting framework for even distribution of load. The machine operates in ball-bearings and the action is smooth and positive. It is equipped with jaws for strip test, grab test, or both in accordance with A.S.T.M. specifications. The normal pulling speed is 12 inches per minute, but, by means of the electro-hydraulic drive, the speed can be varied instantly from one inch to 24 inches per minute. Where double range is desired, suitably calibrated weights will be furnished for changing scales which are hand engraved on a 20-inch segment and mounted level with the operator's eyes.

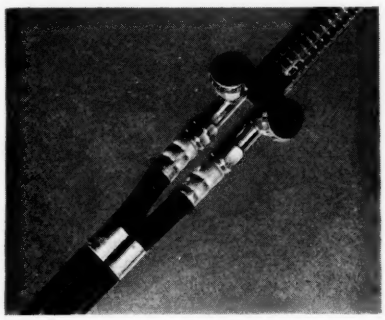
This tensile strength tester is motor driven. Power is hydraulically transmitted by a self-contained electrically driven oil pump unit. The electro-hydraulic control unit is completely contained within the tester, which is of the pendulum type. After the sample is placed between the grips and

(*Continued on page* 68)

New Goods and Specialties

Rubber Base Wrinkle Finish

RUBALT #133 may be used for any decorative work where the characteristic appearance of the wrinkle is desired. This finish has fair adhesion to aluminum, brass, galvanizing, and lead, but its greatest adhesion takes place on steel. It can also be used on wood if the surface is properly prepared. The finish, unusually tough, yet flexible, has a rubber base and comes in a variety of colors. Rubalt #133 is chemically resistant to acid and alkali and can be baked at temperatures of from 135 to 290° F.; the baking time varies with the temperature used. The size of the article to be finished is limited by the size of the oven available. Alfred Hague & Co.



Airco-Twin Hose

Twin Welding Hose

A NEW dual hose consists of two lines of cord-reenforced tubing molded side by side. For use in oxy-acetylene welding, the acetylene line is colored red and the oxygen green for identification. To apply fittings it is necessary only to split along the joint line at each end and slip on the ferrules which prevent further separation of the two lines. This twin hose is available in lengths up to several hundred feet. This single unit should prevent twisting and tangling of the two separate lines of hose which have customarily been used. Air Reduction Sales Co.

Rubber Aids Health

THE new Exercycle for providing home exercise features many rubber parts in its assembly such as grips, treads, toe clips, foot cushions, and insulated wire. Driven by an electric motor, it is noiseless in operation and free from vibration. The rider, in a relaxed state, receives full benefit of the combined exercises of horseback and bicycle riding without undue exertion on the heart. This machine is manufactured by the National Rubber Machinery Co., Clifton Division, Clifton, N. J., for Marlowe Equipment, Inc.

Rifle Sling Pad

THIS new rifle sling pad consists of sponge rubber attached to a leather back. The sponge rubber retards pulsation so that the sling will not cut the arm when the user is carrying the rifle. The pad does not tend to get out of shape, because of the method of fastening the rubber to the leather. Measuring 2½ by 10½ inches, it can be easily attached to the sling. Illustrated are front and back views of the

pad with the sling inserted. Wilder & Co.

Rubber-Lined Pipe and Couplings

THE development of rubber-lined steel pipe for handling waste liquors from the continuous strip-mill pickling tanks at steel mills has solved one of the most important disposal problems, that of being able to convey the uncooled acids ranging from 160 to 200° F. without cracking the pipes, which up to this time have been made from ceramic materials. The first installation of such a sewer, 650 feet of 18-inch steel pipe, has been in successful operation at a steel plant for some time.

The pipe is lined with Triflex rubber which extends over either end of each length and is carried back a short distance on the outside. Triflex rubber is a three-ply acid-proof rubber lining combining the chemical resistance of hard rubber and the expansion and contraction properties of soft rubber. The lengths of pipe are coupled with Flexlock rubber gaskets and rubber-lined split steel sleeves. This gasket,

Home Exercising Machine

with internal and external circumferential ribs that grip both the pipe and the sleeve, snaps over the end of the pipe. The split sleeves with side rubbers compress the gaskets and make a tight joint. Under test the joint withstood 20 pounds' hydraulic pressure. These joints, being flexible, take care of slight angularities in the line without the use of special angle pieces. The ¼-inch space for expansion between each length makes it possible to replace easily a single length of pipe should it be necessary. Two more installations are being made in two large strip mills, one 1,600 feet, and the other 610 feet. Both are using 16-inch pipe. The B. F. Goodrich Co., Akron, O.

Goodrich Sewer Pipe

Rubber Industry in America

OBITUARY

H. B. Post

Herman B. Post

A HEART attack, on July 1, while he was vacationing at Asheville, N. C., caused the death of Herman B. Post, executive of The Goodyear Tire & Rubber Co., Akron, O.

Born in Salt Lake City, Utah, in 1895, he graduated from the University of Utah in 1917, then joined the army. He was assigned to the balloon service and commissioned as a lieutenant, sent overseas, saw considerable service in the "suicide corps."

Entering belting sales for Goodyear after his discharge late in 1919 he became assistant manager of all mechanical goods within three years. In 1926 he took leave of absence because of his health. When he returned, Goodyear's export division, just entering the mechanical goods field, hired him to pioneer that division overseas. His duties grew. Truck tires came under him, then export personnel, then merchandising.

Mrs. Post and two sons survive, also his father, Charles H. Post, who spent some years as a Goodyear salesman in Utah, and his brother Charles.

F. J. Maywald

FREDERICK J. MAYWALD, well-known consulting chemist with laboratory at 301 Hoboken Rd., Carlstadt, N. J., passed away July 3 after a brief illness. He was born in New York, N. Y., June 25, 1870. He was graduated from Cooper Union Institute in 1888 and completed his post-graduate work in 1890; then during 1895-96 Mr. Maywald was a special student at Brooklyn Polytechnic Institute.

The deceased was identified as a consulting chemist since 1888. In 1890 he went to Bartow, Fla., and opened the first chemical laboratory south of Charleston. Four years later he returned to New York to install commercial machinery on a process for utilizing garbage. That same year Mr. Maywald became associated with Dr. Peter T. Austen, of Brooklyn Polytechnic, and conducted a general analytic and consulting laboratory in New York. When Dr. Austen died at the end of 1907, Mr. Maywald continued the business alone. In 1910 he was chairman of the New York Municipal Explosives Committee. During the World War the Maywald laboratories were devoted to inspecting specification goods for the United States Shipping Board and other government departments. In 1922 Mr. Maywald organized the Maywald Rubber Co., Nutley, N. J., of which he served as president. At the time of his death he was head of Maywald-Fleming, Inc., and Maywald-Fleming Patents Corp., both in Carlstadt. The deceased had more than 20 patents to his credit.

Mr. Maywald was also the first secretary of the Rubber Section of the American Chemical Society and a past president of Cooper Union Chemical Society. During his lifetime he belonged to the Masons, Shriners, American Electro-Chemical Society, American Society for Testing Materials, and British Society of Chemical Industries and for a time was quite active in Boy Scout work.

Surviving are his wife, a daughter, and two sons, one of whom, Frederick, Jr., associated with his father the past eight years, will continue his rubber testing laboratory.

Nelson W. Howard

NELSON W. HOWARD, patent lawyer and former executive of the United Shoe Machinery Corp., Boston, Mass., from which he retired two years ago as vice president and a director, died July 18 in Hollywood, Fla. He was born in Lewiston, Me., 64 years ago and was graduated from Bates College in 1892 and Harvard Law School in 1895. After three years with a patent law firm Mr. Howard joined the McKay Shoe Machinery Co., which was absorbed by United Shoe in 1899.

Surviving the deceased are his wife, two sons, and two grandchildren.

Sir Eric Geddes

Sir Eric Geddes

SIR ERIC GEDDES, a leading British industrialist who also rendered invaluable service to his country during the World War, died at Hossocks, Sussex, England, on June 22. Sir Eric joined the board of Dunlop Rubber Co., Ltd., London, in May, 1922, and became chairman that December. At that time the business extended only to tires, wheels, accessories, and golf balls. Within three years the Mackintosh Group of Companies had been acquired and the foundation laid for a wide extension of Dunlop activities. About the same time a commencement was made of the production and use of concentrated latex, in which the company has been a pioneer. Soon after, the board resumed control of the Canadian and Far Eastern companies, and during the remaining years of Sir Eric's chairmanship new factories were established in Ireland, South Africa, and India. The American company at Buffalo, N. Y., is also a part of this organization.

The deceased was born in India in September, 1875, and later sent home to Scotland to be educated. He attended Merchison Castle School, Edinburgh Academy, and the Oxford Military School. When 17, he went to America, where he stayed until he was about 21.

Here he gained a varied experience of railway practice, which proved useful later on when he was building railroads in India, and during the war when the government took over railroads he held many executive posi-

(*Continued on page* 74)

EASTERN AND SOUTHERN

INDUSTRIAL output continues steady, with only minor fluctuations after allowance for seasonal change. Settlement of strikes, particularly in the steel industry, has improved business in many fields. The recent heat waves, however, adversely affected trade, although some agricultural districts benefited. Building contract awards recently recorded a rather marked contra-seasonal rise. In all industries hopes are high for good fall business.

Down South little labor unrest is reported, and most industries are maintaining production close to last year's figures. Orders for fall goods are swamping wholesale houses. Many merchants in agricultural districts have set their budgets as high as 30% in excess of last year's purchases.

U. S. May Imports

May imports of rubber goods into the United States reveal the striking fact that about half the total came from Japan, valued at approximately $55,000 out of total imports of over $108,000. Japan supplied practically all imports of rubber bands, erasers, friction tape, nipples, swimming tubes and floats, and by far the greater part of the rubber belting, toys, water bottles, fountain syringes and rubber balls (except golf and tennis balls). She also sent a larger part of the unspecified rubber manufactures than any other country. The table below shows for May the total imports and Japan's share:

	Total	from Japan
Rubber balls (excluding tennis and golf balls).....	$10,789	$10,454
Rubber toys	4,304	3,889
Swimming tubes and floats	6,928	6,919
Water bottles and fountain syringes	2,166	1,905
Nipples	93	93
Belting	16,632	16,196
Friction tape	1,835	1,835
Erasers	386	386
Rubber bands	386	386
Other rubber manufactures.	28,370	11,872

All the golf balls and practically all the tennis balls entering the United States in May from abroad were supplied by Great Britain. Figures for the former were 128,772 units, value $12,154, and for the latter, 57,300 units, value $5,284. Tennis balls from other countries came to 4,800, value $406. Incidentally imports of all kinds of balls show a remarkable increase during the five months of the current year as compared with December, 1936. Thus golf ball imports had been only 2,525 units, value $441, but a fraction of the May imports; the average for the first five months was 60,000 units, value $7,000, per month. December, 1936, imports of tennis balls at 34,560, value $3,105, were also considerably below the monthly average of 55,500, value $4,900. The same is noted in the case of other balls, which were only 157,526, value $6,447, against a monthly average of 653,000 units, value $20,800. The May imports of 231,703 units, value $10,789, while still much above the December totals, were less than one-third as to quantity and about half as to value when compared with those for the preceding month.

Hohwieler Rubber Co., Morrisville, Pa., is operating to capacity producing football equipment and quoits and hard rubber cleats for athletic footwear.

National Museum Gets Duryea Memento

Charles E. Duryea, first automobile manufacturer to use pneumatic tires on an automobile, has transferred to the Smithsonian Institute the inscribed silver plate which was presented to him on April 14, 1937, by the United States Rubber Co. in recognition of his contribution to the tire industry. This token will be placed in the Charles E. Duryea collection, at National Museum, Washington, D. C.

Duryea Award

On page 71 of our May, 1937, issue details were published as to the part Mr. Duryea had in the institution of the use of the first set of automobile pneumatic tires, which were delivered to him by the Hartford Rubber Works, Hartford, Conn., in 1894, later put into service in 1895.

In the accompanying photograph Mr. Duryea, at the right, is shown presenting the plate to Dr. Alexander Wetmore, assistant secretary of Smithsonian Institute.

Blackstone Studios

Foster Dee Snell

Consultant

Foster Dee Snell, 305 Washington St., Brooklyn, N. Y., president of Foster Dee Snell, Inc., the well-known firm of consulting chemists and chemical engineers, was born in Binghamton, N. Y., on June 29, 1898. He carried out his undergraduate work at Colgate (B.S. 1919) and did his grauate work at Columbia University (A.M. 1922 and Ph.D. 1923).

While at Columbia, Dr. Snell was instructor in chemistry and later taught it at the College of the City of New York. After receiving his doctorate degree he became associated with Pratt Institute where he was in charge of the course in Technical Chemistry.

Immediately after graduating from Colgate, Dr. Snell became interested in consulting work and in 1924 started to build up a staff. In 1928 he found it necessary to give up teaching and devote all his energies to his consulting practice and now has a staff of 25.

Dr. Snell is very active in technical societies, having been honorary secretary of Chemical Industry (American Section) 1926-37, and vice president, 1937-38, and councillor of American Chemical Society for several terms. He is a member of American Chemical Society, American Oil Chemists Society, American Institute of Chemical Engineers, and Societe de Chimie Industrielle, and a fellow of Chemical Society (London), American Association for the Advancement of Science, and the American Institute of Chemists. In addition he is a member of The Chemists Club (New York), the Brooklyn Club, and Brooklyn Rotary Club.

Besides having approximately 20 American patents and many foreign ones, Dr. Snell is the author of more than 30 articles published in various technical journals.

Among his hobbies are listed bridge and boating. Dr. Snell lives at 66 Park Ave., New York, and has one child, a daughter.

Management Congress

The Seventh International Management Congress, bringing to the United States authorities on industrial and commercial management from about 40 countries, will be held in Washington, D. C., September 19 to 23, 1938, with Lord Leverhulme of Great Britain as president, it was announced June 23 at a dinner in the River Club, 447 E. 52nd St., New York, N. Y. The dinner signalized the formation of an American Congress Council, with Willis H. Booth, honorary president of the International Chamber of Commerce, as chairman, to sponsor the gathering. William B. Warner, president of the National Association of Manufacturers, was the principal speaker. William H. Batt, president of S.K.F. Industries, presided, and 30 persons representing large-scale American business interests and professional groups attended.

Harry Arthur Hopf, deputy president of the International Committee of Scientific Management, with branches in 14 countries and others under organization, told of plans for the meeting at Washington. The Seventh International Management Congress will consist of discussions of the latest developments in and the social and economic aspects of management, based on more than 200 papers, selected competitively from experts all over the world. Six sections, running simultaneously, will deal with management problems in production, administration, distribution, personnel or labor relations, agriculture, and the home. Leaders of prestige in American business and business abroad will take part in the discussions, together with invited governmental representatives. This congress, the first to be held in the United States, is being directed by a coordinating committee, with Mr. Batt as chairman, launched by the American Management Council with the cooperation of the following organizations: American Management Association, American Society of Mechanical Engineers, The Association of Consulting Management Engineers, International City Managers' Association, Life Office Management Association, Personnel Research Federation, and Society for the Advancement of Management.

In a letter to leaders of American business, made public at the dinner, Mr. Booth declared: "Our people and other peoples have heard much of capital and labor, but little of management, the third successful element of successful enterprise. There is all too little public realization of the part which management has played in spreading widely the material benefits of a civilization that is right in social and intangible values as well as in goods."

Norman Lee Smith, vice president of Binney & Smith Co., 41 E. 42nd St., New York, N. Y., recently returned from a three-month trip to the Far East. He declared that this brief and hurried journey convinced him that the countries he visited are enjoying a period of good business. India, in the throes of a building boom, impressed Mr. Smith with the tremendous amount of manual labor involved; yet unemployment is very great. In the Malay States advancing prices for tin and rubber were bringing wealth to many and indirectly good times to all, Mr. Smith felt, but he was quite surprised to see how much of the business in Malaya is controlled by Chinese. Shanghai also appeared prosperous and enterprising, and plants were running to capacity. Here again the Chinese are outstanding in the business world, and Mr. Smith believes American and English firms must gradually lose ground. He found Japan industrially all that he had anticipated, perhaps even more so. The rubber companies and paint concerns that he called on, particularly the former, were finding it difficult for production to keep pace with demand, and all this prosperity despite a foreign exchange crisis and a changing crisis.

Vansul, Inc., 112 Broad St., New York, N. Y., supplier of rubber colors, pigments, and fillers, is represented in Canada by the St. Lawrence Trading Co., with offices at 455 Craig St., Montreal, P. Q., and Terminal Warehouse Bldg., Toronto, Ont.

The Evening Textile School, 351 W. 18th St., New York, N. Y., will open its fall and winter session September 13. Registrations will be held from 6:00 to 10:00 p.m., beginning September 8. Among textile courses offered are: cloth analysis and design, textile chemistry and testing, weaving, machine knitting, yarn manufacture, experimental dyeing, decorative fabrics, and general textiles. Classes will also be held in all branches of engineering, machine shop, mechanical drafting, etc. Along with commercial subjects the following will be taught: window dressing, salesmanship, show card writing, cost finding, selling points of knitted fabrics, foreign trade, traffic and transportation problems, clothing and style.

Rapid Grip & Batten

W. J. Scott

The Flintkote Co., Inc., 50 W. 50th St., New York, N. Y., through Advertising Manager L. Rohe Walter has announced that Kenneth E. Moore has joined the organization as assistant advertising manager. Mr. Moore on July 1 resigned from the sales promotion department of Johns-Manville Corp., New York, where he had been employed ten years.

The Neville Co., supplier of coal tar products, Pittsburgh, Pa., on July 1 appointed Calo & Lydon, 90 West St., New York, N. Y., its sales representative in the New York metropolitan district.

Fabric Tensile Tester

(*Continued from page* 64)

the machine started, the pull rod, or piston, travels smoothly in a downward direction. As tension is developed in the sample, the pendulum, with a multiple pawl, swings along the scale plate, and at the instant of breaking, one of the pawls falls into the ratchet sector, thus holding the pointer in place; and the breaking load is read directly from the scale.

This machine can be furnished with a graphic recorder to make a record of the stress and elongation. For studying the effects of varying the rate of loading, the instrument can be equipped with the controllable rate of loading device, and a graphic recorder which makes a power-time diagram in pounds-seconds is provided. Tests may be conducted at a definite or pre-determined rate of loading. Repeated tests may be made duplicating the power-time factor. Where exact duplication of the rate of loading is necessary the required pre-determined curve can be marked on the chart and the test can be duplicated by varying the pulling speed by means of the operating lever. Oil is used as the operating medium, and the entire tester is self-lubricating. Chromium plating, cadmium plating and other rust proofing treatments are used to resist corrosion. Thwing-Albert Instrument Co.

W. J. Scott of Gutta Percha & Rubber, Ltd., Toronto, Canada, on August 6 celebrates at the age of 62 his golden jubilee in the service of the company he joined in 1887, when 12 years old and just three weeks out from England. Securing what was intended to be a temporary job as office boy, Mr. Scott developed it into a lifetime association with the company, for today, 50 years later, he heads Gutta Percha's mechanical goods division.

OHIO

OPTIMISM prevails in Ohio for fall business, including the rubber industry, which anticipates increased tire shipments to automobile manufacturers with the introduction of new models. Recently tire makers raised the prices of original equipment to car manufacturers. Farmers, harvesting good crops, are in the market for many things they have done without during the lean years, especially house repairs and farm equipment.

Goodrich News

Despite current reports that January estimates for the rubber industry were over-optimistic, the outlook for the second half of 1937 justifies a forecast that the year will set new post-depression records in both sales and production, according to Samuel B. Robertson, president of The B. F. Goodrich Co., Akron.

"I see no reason at present to change the prediction made at the first of the year that tire sales as a whole will reach 54,000,000 units for 1937," Mr. Robertson said. "If unforeseen factors do not change the situation, this figure may even be surpassed. On the basis of figures for the entire industry, shipments are about 600,000 units greater per month for the first half of 1937 than for the same period last year."

Mr. Robertson declared that shipments of tires for the first five months of 1937—the only period for which complete figures are available—are estimated at 24,316,000 units, as compared with 21,169,000 units at the same time in 1936.

"Increased tire sales during the first half of the year are due primarily to better business conditions throughout the country as a whole," the Goodrich president stated. "Maintenance of tire prices at a generally low level has also had a beneficial effect."

Over the past 20 years the average truck or bus operator's annual tire bill has been reduced from $600 to $65 as a result of improved tire construction and more economical production, according to Goodrich. Currently more than 3,500,000 motor trucks are registered in the United States, representing a net annual saving of almost $2,000,000,000.

Contracts for the construction of an addition to The Philadelphia Rubber Works, Goodrich's reclaim division, were awarded June 17 and work started immediately. The amount of the building contract was approximately $109,000, and Goodrich will expend in excess of $500,000 in modernizing machinery, processes, and equipment in the company's reclaim division during the next six months. The construction program is the largest undertaken by Goodrich in Akron since the year 1929.

Personnel Activities

Twenty-seven salesmen, one from each Goodrich district throughout the nation, recently were guests of the company. Each salesman was the "champion" in his district during a four-month sales contest. While in Akron their time was filled with golf tournaments, dinners, and other entertainment provided by the company, including a trip to the Great Lakes Exposition and a ball game.

Members of the Goodrich Twenty-Year Service Club recently held one of their most successful annual outings, the third yearly picnic and 20-year service pin presentation ceremony. A crowd of 3,500 attended, including members, their families, and ranking officials of the company. High spot of the program was the presentation by President Robertson of 20-year service pins to 128 employes who have completed that term of service since last January 1. With the addition of these the club now has more than 1,700 on its rolls. Included in the list of those who received pins were Frank G. Harrison, Jr., district manager at Albany, N. Y.; and Marshall F. Davis, Pittsburgh district manager, who came to Akron for their emblems.

First prize of $1,000 in the recent national contest among farmers, sponsored by Goodrich, was won by William R. Brown, R. D. 4, Schenectady, N. Y. Second prize of $250 went to Frank Worth, R. R. No. 4, Shreve, Wayne Co., O. A total of 490 cash awards aggregating $4,000 was made to farmers throughout the country. Essays of 100 words or less on the subject "Why I Would Like to Have Goodrich Silvertown Tires on My Farm Equipment" were the basis of the contest, participated in by farmers in nearly every state. The first prize check for $1,000 was presented the New York man by Mr. Harrison, Albany district manager, John E. Kelly and Clyde C. Johnson, of Kelly & Johnson, Goodrich dealer in Schenectady through whose firm the winner's essay in the contest entered. This firm received first prize among the nation's dealers, $100 in cash.

James J. Brady has been announced as manager of the Providence, R. I., unit of Goodrich Silvertown Stores, at 134 Broad St. Mr. Brady joined Goodrich in 1918 and has held various sales positions in Providence and Boston.

The Columbia Alkali Corp., Barberton, O., through W. I. Galliher, director of sales, has announced the appointment of Vernon L. Clark as district sales manager at St. Louis, Mo., with headquarters at 1106 Central Industrial Ave. Mr. Clark has been in the alkali business since 1929. He founded the Clark Chemical Co., Indianapolis, Ind., which is distributer for Columbia products as one of its major interests. The Clark company is still in operation although Mr. Clark severed his connections with it before joining Columbia.

The Ohio Rubber Co., Willoughby, has announced that Howard W. Schultz, assistant chief engineer since 1930, has been made chief engineer.

Original Tire Prices Up

Original equipment tire prices to automobile manufacturers were raised 10 to 15% July 1 by The Goodyear Tire & Rubber Co., The B. F. Goodrich Co., and The Firestone Tire & Rubber Co., all of Akron, and the United States Rubber Co., 1790 Broadway, New York, N. Y. Original equipment prices were last advanced January 1 by about 5%. A year ago a similar price change occurred. No increase to car manufacturers on primary equipment was made when retail prices were boosted 6% in January and also 6% in March. The price increase will not be uniform, it was understood. The prime cause of this raising of prices to car manufacturers is higher labor costs.

U. S. Rubber supplies most of General Motors tires, with Goodrich second. Goodyear furnishes all of Chrysler and Hudson requirements; while Firestone has been making more than half of all Ford tires.

The Eagle-Picher Lead Co., Cincinnati, has instituted a decentralization plan whereby the manufacture and merchandising of the products are combined under three group organizations. Several major changes in official personnel have also been made effective recently. The resignation is announced of A. E. Bendelari, who has been with the company for 23 years and president since 1929, but he has consented to remain on the board of directors and to serve on the executive committee. His successor, Joseph Hummel, Jr., has been associated with the Eagle White Lead Co. and the Eagle-Picher Lead Co. 45 years as assistant superintendent and treasurer, secretary, and secretary-treasurer. Other new officers are William R. Dice, executive vice president, and Vincent H. Beckman, secretary. William H. Hayt becomes general manager of the White Lead-in-Oil Division, having been with Eagle-Picher 23 years and manager of the Chicago Lead-in-Oil office for several years. T. C. Carter, general manager of the Insulation and Metal Division, has been connected in various capacities with the company's sales and production activities since 1918. Miles M. Zoller, who now takes charge of the Pigment and Oxide Division, came to Eagle-Picher in 1921 and is familiar with production and merchandising of pigments and oxides of lead and zinc used in various products including rubber goods.

General Tire Notes

Directors of the General Tire & Rubber Co., Akron, on July 12 authorized payment to its stockholders of all accumulated dividends on its preferred stock, amounting to $7.50 a share, President William O'Neil announced. Payment will be made in advance of the date of the regular preferred dividend payment, payment to be made on July 31 to stockholders of record as of July 20. There are 27,075 shares of preferred stock outstanding. General Tire preferred dividends have been paid regularly since September 30, 1933. The unpaid dividends were accumulated during the period from June 30, 1932, to September 30, 1933, inclusive, totaling $9 a share, but one payment of $1.50 a share was made subsequently on the accumulated preferred stock.

C. W. Martin, formerly Chicago branch manager for General, has been transferred to Kansas City, Mo., as Kansas City district manager. Mr. Martin has been with General three years, after having served a number of years previously as southern district manager with one of the other larger rubber companies.

Aviation Award

Recognition of notable aid to the development of commercial aviation was given to the General Tire company and to Ray W. Brown, in charge of its aeronautical department, by the National Aeronautical Association at a recent national aviation meet at Lambert Field, St. Louis, Mo. For Mr. Brown's achievement in flying "Miss Streamline," the General Tire Lockheed Vega plane, over a record-making one-day circuit of East, guided entirely by radio direction finder, thus demonstrating its practicability in modern air travel, President Charles F. Horner, of the N.A.A., presented him with two parchment scrolls, certificates of merit for his company and himself, setting forth their contributions to the cause of commercial aviation. The certificates read that "Miss Streamline," piloted by Mr. Brown, assisted by Reeder Nichols, radio engineer, had successfully completed in one day a flight from New York, N. Y., to Albany, to Rochester, to Buffalo, to Pittsburgh, to Cleveland, to Akron, and to Washington, D. C., guided entirely by radio direction finder in the plane, tuned in on Columbia Broadcasting Co. ground stations in those cities, through which a running account from the air of the progress of the flight was broadcast throughout the day.

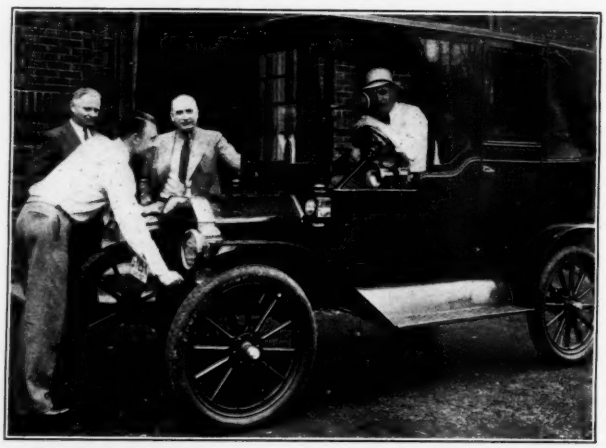
The scroll awarded to General Tire was inscribed: "This certificate is given in recognition of this company's enthusiastic co-operative participation in aiding in the development of commercial aviation."

B.P.O.E., General, and Highway Safety

Radiating the good fellowship and friendliness characteristic of the Benevolent Protective Order of Elks, a dozen "Good Will Ambassadors" last month finished a cross-country safety tour of America. When Francis P. Boland and "Happy" Stanley, two of these "ambassadors" brought their pleas for greater highway safety to Akron, they were received first at General Tire, where President O'Neil, himself an Elk, greeted them. On reaching the Rubber City the Elks reported they had been able to maintain their scheduled itinerary on time because they had no trouble with the General Dual 10 tires with which the half-dozen "Good Will" cars are equipped. A feature of the Elks' tour in the cities visited is a showing of a new safety sound motion picture, "Human Mileage," recently made by General Tire with the cooperation of the New York Police Department and the American Automobile Association. The importance of highway safety is well exemplified in the film.

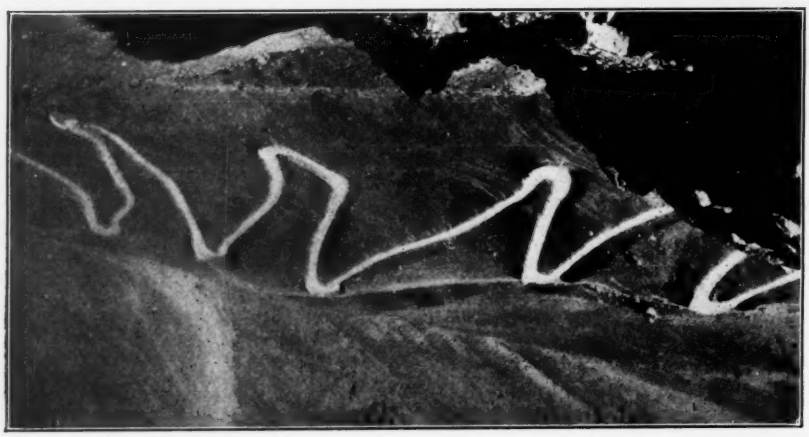
Old Car Gets New Old-Style Tires

With brass radiator gleaming and with its original paint and upholstery almost like new, a quarter-century-old Ford town sedan, once the last word in automotive luxury, came into Akron the other day under its own power. Its owner, W. M. Cessna, of Cadiz, O., en route to Cleveland and the Great Lakes Exposition, told President O'Neil, of General Tire, that the ancient vehicle had been stored away under canvas for over 20 years and that when it was bought by his father, in 1913, to use for weddings and funerals, it was the first closed car ever seen in Cadiz. Its General Cord clincher tires (one of the earliest types made by General) need 45 pounds of air pressure, but the old bus can still make 45 miles an hour without trouble. Luther Jones, Cadiz tire merchant and Cessna's traveling companion, obtained the old-style tires for the car. At Cleveland, Cessna and his ancient equipage were welcomed by C. F. O'Neil, head of The General Tire Co., at 2025 Chester Ave., and Miss Florence Walker, of Mr. O'Neil's staff.



(Right) **W. M. Cessna, Cranking His Old Car with Its New General Cord Clincher Tires, Wm. O'Neil, General Tire President (in Center Facing the Camera), and Luther Jones, Cadiz Tire Merchant, at the Wheel**

(Below) **Andes Mountain Road**



Rigorous Test for Tires

Under severe road and climate conditions, a recent 3,493-mile test trip was made in South America, from Santiago, Chile, to Buenos Aires, Argentina, and return. The car, equipped with General Jumbo low-pressure tires, had to cross the Andes Mountains and the Argentine pampas. During the trip the temperature varied between 0° F. at the mountain top and 114° F. on the pampas. This extreme heat caused the tire pressure to increase from 16 to 22 pounds. On the pampa, roads of loose river bottom sand and dust were followed by swamps of mud and water. The mountain roads were particularly bad, consisting of stretches of loose gravel, sharp rocks in dirt,

and loose round stones. Steep climbs in first gear and sharp 150° turns resulted in extreme test conditions. The tires would spin and bounce, throwing rocks and dirt. About half the entire distance was made over comparatively good roads. After the return trip back to Chile, the tires were examined. Less than a quarter of an inch of tread stock was gone. No time had been lost because of tire trouble.

The Toledo Rubber Products Corp., manufacturer of "Ezy-Rug" (patented) floor mats, Middlefield, has reorganized its corporate structure as of June 1, but with no change in the officers or set-up except the head office is now in Middlefield, instead of Toledo. The plant is running at capacity with thousands of square feet on order from the government as well as other interests. Executives of the company follow: president, Smith M. Johnson; vice president and production manager, Earl W. Coble; secretary, Wm. F. Miller; treasurer and assistant secretary, L. M. Silverthorne; general manager, H. G. Johnson.

The Premier Rubber Mfg. Co., manufacturer of mechanical and hard rubber products, Dayton, according to John Westendorf, treasurer and general manager, is building a second story over its present office, laboratory, and plating department, adding 7,000 square feet of floor space. When this is finished, in about 60 days, office and laboratory will be moved there and the space vacated will be for factory purposes.

Rubber at the Great Lakes Exposition

Rubber products and educational exhibits of growing rubber have an important part in the Cleveland exposition this year. Visitors have an opportunity to visualize the activities of a typical rubber plantation.

Rubber Bathing Suits

At the Aquacade, Billy Rose presents a spectacular extravaganza on a 3,000,000 gallon floating stage, 128 feet wide. The aquatic ballet is adorned with special rubber bathing suits provided by the United States Rubber Co. Old-fashioned suits of taffeta and satin, specially rubberized by Dazians, are worn by the show girls in the Coney Island number.

Goodyear Blimps

With headquarters at the exposition, Goodyear blimps have been flying over the United States publicizing the fair.

On Goodyear Day, July 10, approximately 30,000 Goodyear employes and their families attended the Exposition. The band of 70 pieces and other Goodyear talent gave a much enjoyed concert after parading to the big Radioland shell. The affair, sponsored by the Goodyear Service Pin Association, was an outstanding success.

Rubber Plantation

At the Firestone Tire & Rubber Co.'s exhibit there is a large diorama depicting a typical scene on one of its Liberian rubber plantations. To make this setting realistic, genuine rubber trees are used from which liquid latex actually flows. Mechanical natives can be seen tapping the trees and gathering the latex.

The model farm yard also at the Firestone exhibit has a display of farm machinery, all mounted on rubber tires. An animated mechanical farmer does various things around the farm yard and talks to the people as they pass through the Exhibit.

Synchronized and tuned in tone and color, the Firestone Fountains provide musical concerts for the visitors.

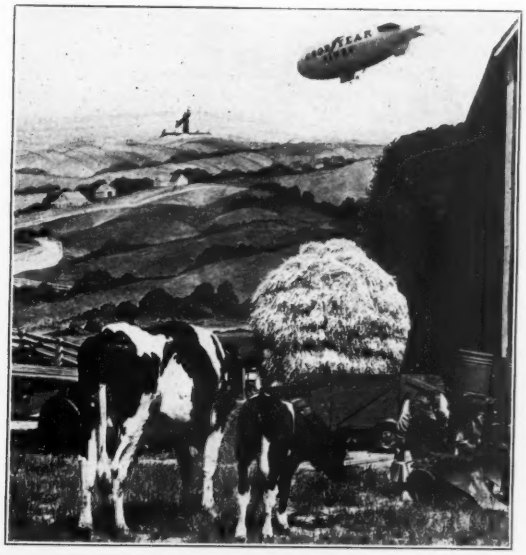
Other Rubber Products

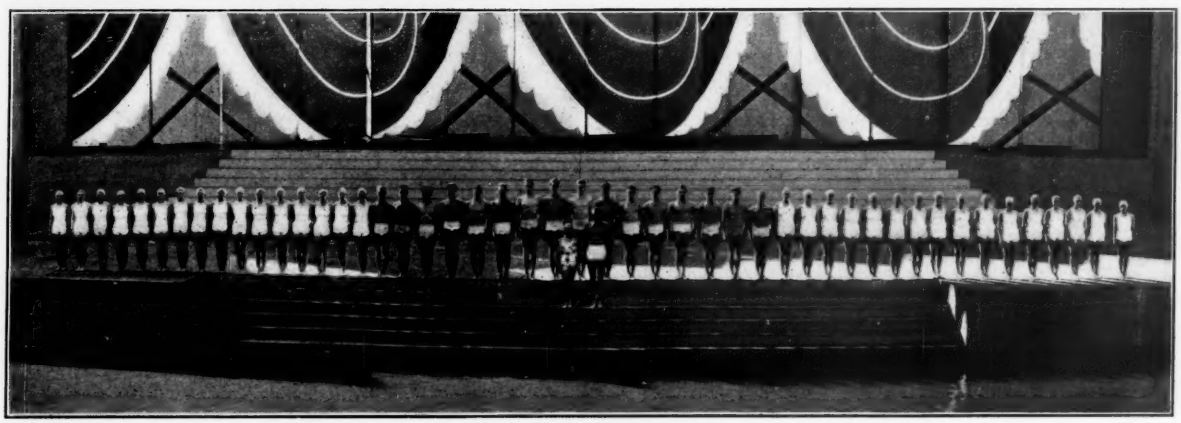
The Ohio Rubber Co. has an interesting display of its products at the Hall of Progress.

(Right)
Goodyear Blimp Over Firestone Farm

✦

(Below)
Diorama of Rubber Plantation





Billy Rose's Aquabelles

NEW JERSEY

NEW JERSEY rubber manufacturers anticipate a very prosperous season next year because of the buying and inquiries for raw materials by automobile manufacturers. Officials say this is an indication that their business will show great gains. Midsummer finds the rubber industry holding its own with a little decrease in business in some places. The demand is good for jar rings and summer footwear.

Thiokol Corp., Yardville, has announced that the word "Thiokol" is a registered mark No. 273,383, applied to various synthetic rubber products and all other products that it manufactures and sells. There are patents on the products and on the processes of making them, and applications for patents on improvements, pending. The word "Thiokol" is subject to the usual laws and regulations governing the use of trade marks. It is not a generic term and should not be used in that manner. It should never be used as a descriptive term applied to products made from it or containing it. It should always appear with an initial capital and be enclosed within quotation marks. When displayed in advertising matter, it should be accompanied by the phrase "Reg. U. S. Pat Off." or it should be spotted by means of an asterisk and coupled with the phrase "Reg. U. S. Pat. Off." or "The registered Trade Mark of the Thiokol Corp."

New York Belting & Packing Co., Passaic, N. J., through General Manager B. F. Ruether has announced the appointment of the Eckerly-Johnson Co., Broad and 13th Sts., Chattanooga, Tenn., as distributer of its mechanical rubber goods in the Chattanooga district.

Puritan Rubber Co., Trenton, is installing new hydraulic machinery in various parts of the mill. With this work in progress, production was cut about 50%, resulting in a temporary lay-off of some employes.

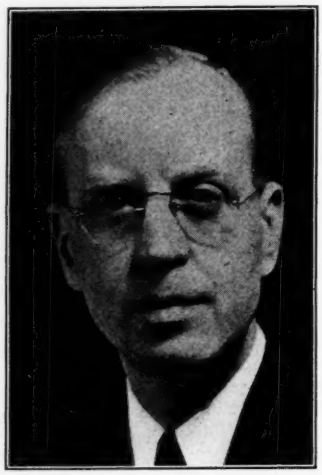
Pocono Rubber Co., Trenton, reports increased orders for rubber cloth, with the factory operating overtime.

Bevis Longstreth, president of the Thiokol Corp., Yardville, has been on a business and pleasure trip through the Midwest.

Browning Morean, president of Whitehead Bros. Rubber Co., Trenton, has been ill for the past several weeks at his home in New York.

The Trenton Tire Dealers' Association, organized about a year ago, has been disbanded. Officials claim there is no further need of an organization because of adjusted tire prices.

Pequanoc Rubber Co., manufacturer of reclaimed rubber, Butler, N. J., through its New England agent, Harold P. Fuller, has announced the change of its Boston, Mass., address to 31 St. James Ave.



Arthur T. Wickers

Laurel Co. Executive

From factory worker during his school vacation days to president of the firm is the record of Arthur T. Wickers, head of The Laurel Co., Garfield, N. J. His only break in service with the company was during 1917-1919 when he joined the United States Army, following the nation's entrance into the World War. Mr. Wickers spent a year and a half in France in the American and French armies on special machine gun work of the ordnance department.

His birthday is February 1, 1895; the place, Brooklyn, N. Y. He attended Passaic, N. J., High School and Stevens Institute of Technology, graduating from the latter in 1916 with an M.E. degree. Mr. Wickers belongs to the Rubber Division of the American Chemical Society and to several Masonic bodies.

He is married and has two children, a boy and a girl. He maintains a residence at 428 Linwood Ave., Ridgewood, N. J.

Murray Rubber Realty Holding Corp., Trenton, had the assessment on its property reduced from $231,000 to $88,900 by the State Tax Appeal Board.

The Lambertville Rubber Co., Lambertville, operating under a trustee, has taken on extra employes in the manufacture of summer footwear.

Milton H. Martindell, vice president and treasurer of the Joseph Stokes Rubber Co., Trenton, was on a ten-day business trip through the Midwest.

Clifford A. Pierce, of Glen Ridge, treasurer of the Pierce-Roberts Rubber Co., Trenton, has been spending some time with his family in the lake regions of the Northwest. The company continues to operate twenty-four hours a day.

MIDWEST

PROSPECTS of farm income remain favorable, with prices of produce at a relatively high level and satisfactory crops coming to market. This condition has contributed materially to the improvement in business in this section. Automobile production rose with the ending of the steel strike, but output dropped as auto plants started closing for inventory and vacations. Electrical equipment dealers recently enjoyed an unprecedented rush of business. Footwear activity also continues good; while zinc and lead properties are increasing outputs. In the Midwest too labor conditions are improving.

Inland Mfg. Division of General Motors Corp., Dayton, O., according to General Manager Wallace Whittaker, will soon start construction of an eastern service plant in Clark Township, south of Cranford, N. J., to be completed in about three months. This new unit will be a branch plant of the Inland Mfg. operations in Dayton, Mr. Whittaker said, and will stock Inland parts manufactured in Dayton for shipment to eastern assembly plants of General Motors and for export markets. The plant will be of modern factory design of approximately 100,000 square feet of floor space, and will employ from 200 to 300 persons. Establishment of this eastern plant is the second major expansion of Inland within the last few months. In mid-April, the firm began the construction of a block square addition to increase its Dayton facilities by more than 80,000 square feet of manufacturing space. This building will be completed within the next few months in time for production of 1938 products, which include steering wheels, running boards, motor mountings, and rubber and metal parts for automotive, refrigeration, and radio uses.

John R. MacGregor, who recently resigned as vice president of Eagle-Picher Lead Co., Cincinnati, O., has formed the John R. MacGregor Lead Co., 4520 W. 15th St., Chicago, Ill. The trade name "Scotch Lassie" has been adopted, and manufacturing has started to produce high-tinting strength basic lead carbonate, basic lead sulphate, red lead, and litharge. Company officers include Mr. MacGregor, president; Howard T. Morgan, vice president; E. B. Dixon, treasurer; and M. Helper, secretary.

W. H. CAMERON, MANAGING DIRECTOR, National Safety Council, reports: "There was an 11% increase in gasoline consumption in 1936 that propelled 28,270,000 vehicles 228,000,000,000 (correct — *not* million) miles over American streets and highways — 22,000,000,000 (correct — *not* million) miles more than in any other year."

NEW ENGLAND

MOST plants in New England are operating fairly actively with a less than seasonal decline. Textiles, although good at present, reports new business is subnormal. The shoe industry is pretty active, with prospects of a summer and fall run above a year ago. New England, except for a few small scattered strikes, continues generally free from labor disturbances.

Phillips-Baker Rubber Co., Providence, R. I., fully equipped for the manufacture of waterproof rubber footwear and rubber-soled canvas footwear, after more than three months' shutdown due to labor troubles, is offered for sale for the purpose of liquidating the business. The entire property, consisting of real estate, machinery and equipment, is to be sold as a unit, no offers for portions of the plant being considered. The sale is in the hands of the Henry W. Cooke Co., 615 Hospital Trust Building, Providence.

Citizens Conservation Corps at Army Base, South Boston, Mass., recently announced contracts totaling $518,567 for footwear. Included in the orders were a $10,902 contract for 3,219 pairs of hip rubber boots to the Converse Rubber Co., Malden, Mass., and a $16,950 contract for 7,500 pairs of overshoes to United States Rubber Products, Inc., Naugatuck, Conn.

Bradley Dewey, president of Dewey & Almy Chemical Co., Cambridge, Mass., for five years a term member on the Corporation of the Massachusetts Institute of Technology, has been elected a life member of the institute's governing board. He is of the Class of 1909 and has long been active in M.I.T. affairs, both alumni and administrative.

Farrel-Birmingham Co., Inc., Ansonia, Conn., in appreciation of their long and loyal service presented 144 men with 25-year service pins at a banquet June 17 honoring employes with the company a quarter-century or more. At the head table with company officials were veterans who have worked for Farrel-Birmingham 50 years. Of the men present 100 had over 30 years' service to their credit, and 37 had over 40 years. Of the 114 recipients of service pins 44 had been with the company 25 to 29 years; 23 from 30 to 34 years; 29 from 35 to 39 years; 10 from 40 to 44 years; two from 45 to 49 years; and six for 50 years or more. Besides these 114 still in active service, Farrel-Birmingham has 30 retired employes with exceptionally long service records: Five served from 30 to 34 years; six from 35 to 39 years; nine from 40 to 44 years; seven from 45 to 49 years; and three 50 years or longer. Toastmaster at the banquet was Nelson W. Pickering, president of Farrel-Birmingham. With him and the 50-year veterans sat Charles F. Bliss, former president; Franklin Farrel, Jr., chairman of the board; and James W. Hook, president of the Geometric Tool Co. and head of the New England Council, who delivered the principal address. In welcoming the guests Mr. Pickering recalled that Farrel-Birmingham employes 25 years ago numbered 800, of whom nearly 18% were present; and of the company's 500 employes in 1900, 10% were in attendance.

Some of the Old Timers Honored at the Farrel-Birmingham Dinner

U. S. Rubber

A fuller and more open relation between industries and the communities in which they settle was urged by Cyrus Ching, director of industrial relations of the United States Rubber Co., 1790 Broadway, New York, N. Y., at a luncheon meeting address before the Bristol Rotary Club at the Hotel Belvedere, Bristol, on June 30. In developing his theme of the industrial-public relation, Mr. Ching said business was too tolerant in some instances and not sufficiently intolerant in others.

"We must have tolerance enough to compromise on our differences," he declared. "American industry has done a marvelous job in production and in raising the standard of living," he continued, "but in the past thirty years it has failed notably in one respect, that is in selling itself to the public. Americans take for granted all they have received, giving little credit to the initiative, daring, and engineering of industry. This lack of understanding on the part of the industrialists has resulted in a failure to take their employes into their confidence. Yet the workers must be treated as part of an organization. Efficient business can only be conducted by a well organized force. The workers should know what is going on in their organization and have as much right to such information as the stockholders themselves.

"The same degree of understanding must exist between industry and the community. In order to attract industries some communities have exploited themselves beyond reason. New concerns in good times have brought hundreds of new residents to these communities, only to leave them without employment during lean times, to the community's misfortune. The company with which I am associated is now operating a wire division in Bristol where nearly $750,000 will be spent this year. Its personnel tends to remain steady, or increase rather than to fluctuate, which must be the case if the community is to be benefited. The relations of a community to industry are important," the speaker concluded. "Industry should be a good neighbor to its community and be as much interested in making its contribution as the community is in making its own."

Nearly 1,500 employes of U. S. Rubber in Providence, R. I., with their families and friends, attended their annual outing at Rocky Point on June 24. The program included field events and water sports. A baseball team representing the local plant defeated a contingent from the Bristol wire factory by a score of 3 to 1. An optional shore or chicken dinner was served during the afternoon. The program was concluded with dancing where a prize waltz had numerous contestants.

United States Rubber Products, Inc., held its annual footwear sales meeting in preparation for the advanced selling season for Keds in the East this year instead of in the Midwest as has been the custom. About 200 footwear salesmen from the various branch stores throughout the United States were entertained from July 22 to 24 at Atlantic City, N. J., and during July 26 to 28 they were at the footwear plant in Naugatuck, Conn., where an opportunity was given them to see present methods of manufacture and become familiar with new materials and construction of the products they sell.

ALTHOUGH BUTYL ALCOHOL IS ALREADY used in manufacturing a number of rubber accelerators, its xanthate was recently under investigation as a vulcanization accelerator for rubber cements. While buytl xanthate proved the most efficient among the accelerators studied, it presented several difficulties such as decomposition in handling. Further studies are being made.

FINANCIAL[1]

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

Baldwin Rubber Co., Pontiac, Mich. Six months to June 30: net profit, $335,666, equal to $1.20 each on 278,604 shares of $1 par common stock, against $245,064, or 88¢ a share, a year ago. Net profit for the June quarter was $159,616, or 57¢ a share, against $176,050, or 63¢ a share, in the preceding quarter and $123,978, or 44¢ a share, in the June quarter of 1936.

Brown Rubber Co., Inc., Lafayette, Ind., through James J. Boylan on July 20 offered 140,000 shares of $1 par value common stock at $5.25 a share. The offering constitutes new financing by the company to the extent of 40,000 shares, the remaining 100,000 shares to be sold for certain stockholders. Proceeds received by the company will be used to retire all promissory notes issued in payment of dividends, and for added working capital.

Net income of the company for the first five months of 1937, after all normal taxes, but before provision for any surtax on undistributed profits, amounted to $90,483, compared with $141,091 for the full year 1936. Authorized capitalization of the company, which has no funded debt or preferred stock, consists of 300,000 shares of common stock, of which 200,000 shares are to be outstanding.

Cambridge Rubber Co., Cambridge, Mass., and subsidiaries. Thirteen months to January 31: net income after surtax, $163,286, against $79,143 in the year to December 31, 1935; sales, $4,734,306, against $3,005,186.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Preliminary report, first half of 1936: earnings equivalent to $3.41 a share on the common stock, against $3.27 a share for the same period last year. For the quarter ended June 30, 1937, indicated earning, based on a comparison of the company's reports for the first quarter and the six-month period, were equal to $2.07 a common share, compared with $1.34 a share in the preceding quarter and with $2.06 a share in the June quarter a year ago.

Freeport Sulphur Co., 122 E. 42nd St., New York, N. Y. March quarter: net income after company's share of losses of Cuban-American Manganese Corp., $543,287; equal, after dividend requirements on 6% preferred stock to 66¢ a share on 796,372 shares of $10 par common stock. Net income last year was $476,123, or 57¢ a common share.

General Electric Co., Schenectady, N. Y., reported sales billed for the first half of 1937 totaled $171,076,645, against $119,273,388 during the corresponding period last year, a 43% increase. Profit available for dividends for the first six months of 1937 amounted to $26,293,604, compared with $16,592,324 for the first six months of 1936, a 58% increase. This six months' profit is equivalent to 91¢ a share of common stock, against 58¢ a share in the same period last year. A 40¢ dividend was declared for the first quarter, and an additional 40¢ a share was paid July 26 for the second quarter, a total of 80¢ a share for the first half of 1937, compared with 50¢ a share for the corresponding period last year.

Hewitt Rubber Corp., Buffalo, N. Y. Six months to June 30: net income, $200,017, equal to $1.19 each on 168,188 shares of $5 par common stock, against $129,134, or 77¢ a share on present capitalization, a year earlier.

Martin Custom Made Tires Corp., 645 Eleventh Ave., New York, N. Y. Six months to June 30: net profit, $36,514, against profit of $24,108 last year. Gross sales, $474,101, increased 40% over $338,408 sales of the same period in 1936.

Monsanto Chemical Co., St. Louis, Mo., on July 15 through Edward B. Smith & Co. offered 50,000 shares of $4.50 cumulative preferred stock, series A, no par value, priced at $101.50. Directors of the chemical company made no specific allocation of the net proceeds from the sale, estimated at $4,922,485 after deducting estimated expenses. The proceeds, therefore, will be added to the general funds of the company and expended for capital additions, replacements and improvements to plants, processes, and facilities to meet increased demands for products. The cumulative preferred stock will be redeemable at the option of the company, in whole or in part, at $110 a share if redeemed before July 1, 1947, or at $107.50 if redeemed thereafter. An amount equal to $100 a share will be credited to the capital stock account of the company and the difference between such amount, and the net proceeds received by the company will be debited to the paid-in surplus account.

[1] Dividends Declared on page 83.

Obituary

(*Continued from page* 66)

tions, becoming Minister of Transport from 1919 until 1921. He was First Lord of the Admiralty 1917-18, and became a member of the Imperial War Cabinet. On retiring from ministerial service, he was appointed the chairman of Dunlop and of Imperial Airways. In recognition of his national services he was made a Privy Councillor in 1917, receiving the G.B.E. and K.C.B., and in 1919 the G.C.B. was conferred upon him. In 1920 he was made an Hon. LL.D. of Sheffield University. He was also president of the Federation of British Industries during 1922-24. Sir Eric was deeply interested in aviation, and one of the most important tasks of the last years of his life was the completion of the scheme for the Trans-Atlantic Air Service. After his cremation the ashes were dispersed over the sea from the *Caledonia,* the flying boat which made the first trans-Atlantic trip.

He received his knighthood in 1916. In 1900 he married Gwendolen Stokes. Three sons also survive.

Earnings and Hours in Rubber Industry[1]

	Rubber Tires and Tubes			All Rubber Manufacturing		
Date	Average Hourly Earnings	Average Weekly Earnings	Average Hours per Week per Wage Earner	Average Hourly Earnings	Average Weekly Earnings	Average Hours per Week per Wage Earner
July, 1914	....	....	....	$0.250	$12.28	49.1
1920	....	....	....	.673	28.26	41.9
1921	....	....	....	.576	25.17	43.8
1922	....	....	....	.578	26.19	45.3
1923	....	....	....	.628	28.03	44.8
1924	....	....	....	.637	28.11	44.1
1925	....	....	....	.652	29.01	44.5
1926	....	....	....	.660	29.68	45.0
1927	....	....	....	.660	29.99	45.4
1928	$0.708	$32.84	46.4	.651	29.97	46.1
1929	.728	31.99	44.0	.661	29.58	44.8
1930	.734	29.56	40.2	.658	27.26	41.4
1931	.695	25.72	37.0	.651	24.86	38.1
1932	.651	20.64	31.6	.599	19.87	33.1
1933	.657	20.97	32.0	.600	19.67	32.7
1934	.800	25.16	31.5	.750	24.23	32.3
1935	.868	28.01	32.3	.801	26.52	33.1
1936	.891	31.41	35.3	.756	27.64	36.6
1937 Jan.	.917	30.42	33.2	.769	27.67	36.0
Feb.	.937	32.34	34.5	.805	27.97	34.8
Mar.	.955	32.47	34.0	.830	29.76	35.9
April	.963	32.29	33.5	.837	29.47	35.2
May	.992	32.20	32.4	.860	30.10	35.0

[1] Source: National Industrial Conference Board, 247 Park Ave., New York, N. Y.

Rubber Industry in Europe

GREAT BRITAIN

Synthetic Rubber Rollers

A recent patent, B.P. No. 457,937, recommends synthetic rubber of the polymerized halogenated acetylene type to make covers of drawing rollers used on spinning and preparatory machines in the textile industry, to take the place of leather coverings. According to the purposes for which the rollers are destined and the varying degrees of hardness desired, 16 to 65% of synthetic rubber, as chloroprene, is compounded with suitable proportions of soft gas black, magnesium oxide, zinc oxide, rosin, and phenylbetanaphthylamine. Cork dust or other filler may be added. Rollers made of such a mix are said to have a high resistance to abrasion, nor are they affected by oil, water, mild acids, weak alkalies. They can be buffed, when they will not pick up lint, and they do not become slimy in wet operations. Compounded with cork dust as a filler and treated to give a Shore hardness of 70-75, the composition is suitable for the top rollers of spinning, twisting, drawing, carding, combing and similar machines; without the cork dust and hardened to 95-97, the mix serves for the feed rollers of such machines and of coilers, spoolers, warping machines, slashers, lap machines, etc.; and with cotton flock and hardened to 80-85, for the aprons of longdraft apparatus for spinning machines and for the aprons of bale breakers, lattice feeders, hopper feeders, lap machines, willow openers, and the like. The composition may be produced in the form of tubing or sheet or it may be made in liquid form for spraying and impregnating fabrics.

Americans Visit Croydon

An important group of American business executives and bankers representing the National Research Council of America has been studying research organization in Great Britain and on May 27 visited the laboratories of the Research Association of British Rubber Manufacturers at Croydon. The group included Maurice Holland, director of the division of engineering and industrial research of the National Research Council; C. R. Alexander; B. H. White, vice president of the Liberty Bank; Chauncy L. Williams, vice president of the Dodge Corp. of New York; and J. H. Shertz, of the Pittsburgh Plate Glass Co. They were accompanied by Warren H. Lockwood, U. S. commercial attache in London. The party, received by B. D. Porritt, director of research, Prof. W. Makower, representing the Department of Scientific and Industrial Research, and Dr. S. S. Pickles, on behalf of the board of management, spent more than two hours inspecting the laboratories and library and appeared to be much impressed by the work done at Croydon.

Gas Masks for Civilians

English production of gas masks for the civil population is ahead of that of any other country, the House of Commons was recently informed. Up to June 19, 1937, no fewer than 9,000,000 masks had been made. At present there are four large regional supply depots with a total capacity of about 11,000,000 gas masks, and another nine such depots are yet to be established. The masks are not to be distributed until an emergency arises, and plans for distribution from the original depots have not yet been worked out.

Rubber in Airplanes

The latest airplanes built for Imperial Airways, Ltd., are said to be the largest air-liners in the world. Those intended for the European lines can carry 42 passengers. These airplanes are equipped with enormous landing tires which have a diameter of 6 feet 3 inches and are 2 feet 2 inches thick. This company is also introducing on all-Empire flying boats a new type of rubber seat that can be converted into a life belt in less than 10 seconds. The seats weigh less than 5 pounds each and are able to support 280 pounds indefinitely in water.

Rubber and Asphalt Road

For some time investigations on combinations of rubber and asphalt for road surfacing have been conducted by the Imperial Institute, South Kensington, which is cooperating with the laboratories of the Limmer & Trinidad Lake Asphalt Co. on behalf of the Rubber Growers' Association. Preliminary tests indicated that used in certain proportions, which at present are secret, a combination of asphalt and rubber gives a rough, granular surface with good anti-skid properties. Consequently it has been decided to subject the mix to a large-scale test, and work has been started on laying an area of 4,500 square yards in Canford Cliffs Road, Poole, Dorset.

Company News

Paragum, Ltd., was recently formed with a capital of £5,000 in 5,000 £1 ordinary shares to carry out an agreement between John P. Boiardi and Wm. F. Wren, on the one hand, and Hecht, Levis & Kahn, Ltd., on the other, by which the company acquires the formula for the production of Paragum, exclusive manufacturing and selling rights for Paragum, and certain manufacturing and selling rights of the Prentice Zip Fastener. The directors of the concern are John P. Boiardi, director of Famous Products, Ltd., Wm. F. Wren, Alfred E. H. R. Overman, and James E. M. Mason.

William Warne & Co., Ltd., recently celebrated its centenary. The concern was founded in 1837 under the name of London Caoutchouch Co. In 1850 it was bought by William Leaf who, taking the name of the accountant of the company, called it William Warne & Co. After some years control of the company went to George Coles, Leaf's son-in-law, and when the latter died in 1884, his three sons, Frederick Warne, and the then-manager James Burbridge, who, by the way, brought the firm its greatest prosperity, were left as partners. The partnership lasted until 1895 when the firm became a private limited company. In 1924 it absorbed the Isleworth Rubber Co. In the 100 years of its existence the company extended its field of production to cover a very wide range of articles and in that time too it developed a number of original patents. It was the first to use antimony sulphide as a vulcanizing ingredient and the first to use hard rubber to attach soft rubber to metal; it manufactured rubber thread as early as 1863 and still leads in this field. The Sinclair method of cold-curing waterproofs, now the standard method for single texture garments, was patented by Warne; it was among the first firms to take up the production of reclaim which it made by a secret process of its own for which special machinery was built in 1888. Tire manufacture was started in the '80's, and in the early years of the present century Warne's red inner tubes were said to be the best in the market. Through all the years the firm has remained in the hands of the family of the founders, four of the present directors being direct descendants of William Leaf; while a grandson of the original William Warne was managing the thread sales department up to 1928.

A POLISH CONCERN, IT IS SAID, PLANS erecting a new tire factory at Dembica, near Tarnow, to employ about 2,000 persons.

GERMANY

Rubber Society Meeting

The tenth annual meeting of the German Rubber Society took place July 5 to 7, 1937, at Frankfurt a.M. in connection with the general meeting of the German chemists (July 6 to 10). On that occasion the following papers were read: "The Kinetics of the Coagulation of Hevea Latex and the Separation of Hydratic Acid," by Dr. N. H. van Harpen; "The Properties of Buna Latex," by Dr. Otto Baechle; "Comparative Viscosimetric Measurements on Solutions of Crepe Rubber and Buna," by Dr. W. Philippoff; "New Testing Methods for Soft Rubber," by Dr. H. Roelig; "Thioplasts—Their Manufacture and Use," Dr. Spielberger (jointly with the section "Chemistry of Synthetics" of the German Chemical Society); "Plastics, with Special Reference to the Requirements of the Rubber Industry," Dr. Schwartz; "Determination of the Tear Resistance of Vulcanized Rubber," Dr. D. J. van Wijk; "Modern Problems of Rubber Reclaiming," Dr. F. Kirchhof.

Statex Thread

A new type of rubber thread called Statex thread was recently developed in Germany.[1] By this process a core of natural or artificial fiber, which is not absorbable by rubber or rubber solutions, is covered with rubber and vulcanized. The inelastic thread thus obtained is covered with textile fiber and converted into braids, webbings, knitted fabric, and the like in the usual way. The final product is then rendered elastic by treatment with caustic carbonizers or solvents by which the thread core is destroyed or dissolved without injury to the rubber or the outer textile cover.

The core may be rubberized in a variety of ways, by spraying, dipping, or passing the thread through a nozzle into the coating mass. If it is decided to remove the core by immersion in a suitable solution, then the core thread selected should be an acetate fiber or a mixture of methylene chloride and methylalcohol. This treatment with solvent is said to have the additional advantage of removing excess sulphur and accelerator from the rubber.

If the core is to be destroyed by carbonization, the thread, which in this instance may be of natural or artificial fiber, is first treated with acid substances or lye and dried before being coated with rubber. Then the finished product is subjected to heat or irradiation to destroy the core. In this case too a final bath in suitable solvent is recommended.

The coating mass may be in the form of a solution of rubber in organic solvents, or natural or synthetic rubber dispersions, to which may be added fillers, colors, vulcanizing agents, accelerators, etc.

As we see, the method is complicated and more expensive than the usual processes, but it is claimed that the advantages it offers amply make up for any extra cost or trouble. Thus an article made with Statex thread can be rendered elastic in any part and at any time desired; but the most important advantage is that the thread can always be maintained at a uniform and almost absolutely constant tension throughout the manufacturing process. These two improvements, it is pointed out, will greatly widen the field of application for this type of thread.

[1] German patent No. 613,235.

Use of Carbon Blacks Restricted

On June 14, 1937, a new order was issued prohibiting the use of any but locally produced lamp, oil, and acetylene blacks for a variety of articles including packings, bicycle handles, mats and runners, cements, all kinds of hard rubber goods, insulating tape, cables and wires of all kinds (in so far as the mix has a raw rubber content of up to 59% by volume), manhole rings, tires for baby carriages, color for tires, shoe soles (tennis, gymnasium, etc.), solid tires (except army and tractor tires).

Restrictions and the Development of the Rubber Industry

The above ruling adds another to the many restrictive measures imposed on rubber manufacturers by the present government. During the last two years rubber manufacturers have seen exports of scrap banned; they have been practically forced to standardize production and to cut down color ranges; for footwear and tires only black was permissible, and for surgical goods, only red. Sizes of solid tires for domestic use were limited early in 1936. In June of the same year government assumed control of the manufacture, sale, and purchase of artificial rubber, and later in the same month tire retreading also came under government control. On October 19, 1936, the government decided to take steps to acquire a reserve stock of rubber for emergency purposes; this is generally understood to be a military measure. The beginning of the current year saw the prohibition of the use of rubber in the manufacture of 114 different specialties and small articles except for export purposes. The latest measures have been the imposition of the 100% duty on imports of crude rubber (May 13, 1937) to provide revenue for the large-scale production of synthetic rubber and later in the same month, to balance this duty, vastly increased levies on imports of a wide range of rubber goods.

Despite all the restrictions, however, military requirements and extended motorization in the country have led to a rapid increase in the imports of crude rubber since 1932 as the following table shows:

GERMAN IMPORTS OF CRUDE RUBBER 1932-1936

Year	Tons
1932	45,000
1933	54,100
1934	59,300
1935	62,900
1936	71,793

At the same time we note a considerable growth in the exports of German tires and tubes, especially for cycles. Exports of belting and hose have also expanded, but those of rubber footwear have fallen steadily, as the following table shows:

GERMAN EXPORTS OF CERTAIN RUBBER PRODUCTS

	1933	1934	1935	1936
Motor car casings, *No.*	130,789	173,897	188,001	271,527
Motor inner tubes, *No.*	99,104	112,883	107,813	145,171
Solid tires, *No.*	2,568	2,651	4,206	2,949
Bicycle casings, *No.*	401,378	432,793	933,148	1,003,902
Bicycle inner tubes, *No.*	410,283	357,870	760,814	990,622
Rubber hose, 100 *Kilos*	9,772	8,845	10,511	10,764
Rubber belting, 100 *Kilos*	2,512	1,546	1,898	3,333
Rubber shoes, *Prs.*	727,693	545,508	334,387	333,307

EUROPEAN NOTES

The rubber manufacturing concern, A. S. Norske Gummiprodukter, Stavanger, Norway, which started operations about two years ago, will raise its capital from 550,000 to 800,000 Kroner.

Czechoslovakia is another country taking keen interest in the possibilities of producing synthetic rubber. The alcohol industry will undertake investigations in this direction and is said already to have ended preliminaries.

From Italy comes the news that a company in which the government and private parties will participate is to be formed to make synthetic rubber.

Michelin et Cie., Paris, France, reports a loss of 10,420,000 francs over 1936 against net profits of 30,760,000 francs the year before. The company was hard hit by the failure of the Citroen concern and in addition suffered as a result of labor troubles. However it was able to turn out the same dividend as the year before, namely 50 francs for each sixth share. The Societe Belge du Pneumatique Michelin, Brussels, Belgium, also booked a loss for 1936 amounting to 147,547 francs.

Etablissements Hutchinson, Paris, reports net profits of 10,400,000 francs at the end of 1936, against 10,540,000 the year before.

Rubber Industry in Far East

MALAYA

Prices and Restriction

On May 19, the new building of the Rubber Research Institute in Ampang Road, Kuala Lumpur, was formally opened by Sir Shenton Thomas, High Commissioner of the Malay States, when he took the occasion to make some provocative remarks on the subject of prices and restriction. With regard to the price of rubber he said:

"Cheap rubber is the best insurance against the effects of slump conditions and the surest way of promoting new uses and expanding markets; and one of the chief duties of the Rubber Research Institute is to help the industry to produce rubber cheaply. And this is all the more important now that we are beginning to hear of synthetic rubber. I would not be an alarmist, but I believe it to be a fact that thousands of tons of synthetic rubber are being made today. I do not say that the manufactured article is so good or so cheap as that made from natural rubber and I do not say it will be for some years to come, but, bearing in mind the past successes of research, he would be a bold man who will deny the possibility at some time or other of reasonably good synthetic rubber at a reasonable price. . . .

"I deplore, as anyone in the industry must deplore, speculative booms such as we have witnessed. They retard research, they check the expansion of markets, and they are a direct incentive to competition. And that is why the Malayan Governments, so long as I am here, will do everything in their power to assist the International Rubber Regulation Committee to maintain the price of rubber at a reasonable level which I conceive to be about 9d. or 10d. a lb. I want that to be very widely known."

"As for restriction, it is not permanent. It may last for some time," Sir Shenton Thomas said, "but it is an artificial device and so must lack permanency. I have said on other occasions and I say it again, that I look on this time of restriction as a breathing-space for the industry to set its house in order. When the next slump comes, as come it will, the inefficient and the expensive will go to the wall. I have no doubt about that."

Many in the industry will agree with Sir Shenton Thomas on the question of price and probably share his views on restriction. However just at present most growers want restriction renewed for another period, but they would like to see certain modifications, especially with regard to new planting. A large section of the industry would state the case for new planting in much the same terms as the *Straits Times* used in a recent editorial:

"Consumption is increasing at the rate of between 50,000 and 80,000 tons a year; world stocks have been reduced to around 4 months' supply at the present rate of consumption, a level which some consider below the safety line; the Dutch native producer cannot expand his output much beyond the present assessed capacity; the areas planted since 1930 are very small; an export quota of 90% is probably beyond the productive capacity of a good many estates in Malaya. Add the important point that production stage is not reached until a minimum of six years after planting, bringing 1945 as the earliest period in which there will be any addition to the productive capacity. Full consideration of all these factors can result in one conclusion and one conclusion only—new planting must be allowed in any extension of the control scheme."

New Building of the R.R.I.

The Rubber Research Institute of Malaya was established in 1925 to take over the research and technical advisory work on rubber production for the whole of Malaya. Up to that time this work had been done by the Department of Agriculture of the Straits Settlements and of the Federated Malay States and by the research organizations of the Rubber Growers' Association and other bodies. It was not until 1927 that the institute had collected its full staff and equipment and commenced operations temporarily in a building on Damasara Road, Kuala Lumpur. The institute soon outgrew this accommodation, so a larger and permanent home was needed.

The new buildings, just opened, occupy about six acres and include five separate single-story blocks. Here are housed the administration, the botanical division, the pathological division, the soils division, and the chemical division. The latter is the largest section and the most important. All equipment is thoroughly up-to-date. The main entrance hall, which has an area of about 1,400 square feet, is covered with inch-thick rubber tiling in a handsome marbled effect; it was laid by the Singapore Rubber Works.

The Chemical Division is in charge of Dr. E. Rhodes, who has for some time been carrying on investigations in the treatment of latex and the modifying of rubber, reports of which have been published in the *Journal of the Rubber Research Institute*. The present program covers work to solve the problems of producing rubber with low water absorption for the cable industry; soft rubber; rubber with high resistance to oil and solvents so as to offset the advantages of synthetic rubber in these respects; the production of chlorinated and brominated rubber direct from latex. Headway has already been made in separating the non-rubber constituents of latex, and work is continuing in this direction as well as in the search for preservatives other than ammonia and in the developing of new methods of concentrating latex.

INDO-CHINA

At the beginning of 1936 Indo-China had 843 Hevea plantations with a total planted area of 126,000 hectares including 37,938,000 trees. A remarkably large proportion of the trees were budded, in all 16,332,000 trees, or 43% of the total. The planted area in bearing came to 75,000 hectares and produced 40,000 tons in 1936, against 29,000 tons in 1935.

Most of the plantations were in Cochin-China, that is 783 with a total area of 97,000 hectares, with 58,000 hectares in bearing. But the largest estates appear to be in Cambodge, where the 40 plantations cover 27,300 hectares, of which 16,500 are in bearing. Besides there are small rubber areas in Annam and Laos. Natives also have a share in the rubber industry although they do not play nearly so important a part as do the natives in Malaya, Sumatra, and Borneo, for although they own 431 of the total plantations, these are extremely small and have an area of only around 8,000 hectares, of which 4,250 are tappable. The number of trees on native holdings is 2,612,000, of which 55,000 are budded, a notable fact as it not only reflects the progressiveness of the native rubber growers here, but also shows that the budded area on European estates is larger than the total figure above indicates. For, deducting the number of native-owned budded trees, we find the total percentage of budded trees is actually 46%. Indo-China thus has the distinction of having a higher percentage of budded trees than any of the other rubber growing centers in the Far East.

NETHERLAND INDIA

Export Statistics

Figures for rubber exports over the first five months of 1937 show that while estate exports were short, 81,848 tons out of a permissible 88,762 tons, native shipments were somewhat in excess, having been 83,059 tons against 80,741 permissible. However stocks of estate rubber on estates and in hands of recognized dealers were 20,000 tons at the end of May, against 16,779 tons at the end of April. Stocks of native rubber in the hands of recognized exporters in the Outer Provinces were 11,087 in May and 10,049 tons in April. Preliminary figures of exports in May show 7,690 tons of estate rubber shipped by estates from Java and Madura, 10,888 tons from estates in the Outer Provinces, and 20,610 tons from native holdings; altogether 39,188 tons for the month.

Potential Native Output

The vexed question of what outputs may be expected from the natives of Netherland India is again to the fore as a result of the published figures of the tree census. When the census was nearing completion toward the end of last year, revelation of the vast number of holdings registered led to rather fantastic estimates of native potential outputs, some figures being placed as high as 1,000,000 tons per annum. Now that native rubber admittedly includes a large proportion of poor trees, the tendency is to swing in the opposite direction, and doubt is expressed whether the natives will be able to do more than fill their quotas, if that. In many quarters it is held that the native areas are not capable of yielding more than 250,000 to 300,000 tons. To reach this figure the calculations usually are along the following line: the total native area is known to be about 1,700,000 acres; a large proportion is inferior; so a yield of not more than 400 pounds per acre, if that, is to be expected.

If we compare the acreage and the number of trees given, however, we find that there are on an average about 350 trees per acre, and it is hard to believe that the greater part of even the native areas is incapable of yielding better than a little over one pound of dry rubber per tree per annum.

Of course, even if it could be proved that potential was double the above amount, it would not follow that the whole of it could be actually produced. There are so many factors affecting output: a good price may bring out large quantities of rubber for a time, and then the natives, flush with money, may decide to take it easy for a while, and tapping will fall off. Again, in those sections where the natives do not depend entirely on rubber, prices of other commodities and foodstuffs will influence the tapping policy. Finally, there is the question of labor; in Sumatra and Borneo the population is comparatively sparse so that a sudden increased demand for coolies soon creates a shortage.

CAMEROON

The improved price of rubber has had the effect of stimulating the production of rubber in Cameroon, now under French mandate. While 1935 exports were 748 tons, those for 1936 jumped to 1,197 tons.

BRAZIL

According to a press report from Brazil, a large corporation made up of Brazilian and German interests is being formed to obtain rubber from Acre in Brazil for German consumption. It seems that German technicians, after visiting the Madeira River in 1936 and spending some time in Acre, reported favorably to the German government with the result that conferences between it and the Brazilian ambassador in Berlin followed. This scheme does not appear to be one of colonization, for it is planned to use Brazilian labor exclusively, with the exception of the experts, who will be German. Moreover the corporation is to be under control of the government of Brazil.

Brazilian Rubber Statistics —1928 - 35[1]

RUBBER EXPORTS

Year	Metric Tons	Value—Contos de Reis*
1928	17,513	52,589
1929	17,556	47,466
1930	11,928	23,294
1931	10,438	16,704
1932	5,065	7,136
1933	7,657	13,804
1934	8,167	19,332
1935	12,370	36,064
IMPORTS OF RUBBER TIRES AND INNER TUBES		
1928	4,294	33,470
1929	5,408	40,124
1930	3,226	24,446
1931	2,788	23,067
1932	1,947	14,545
1933	4,957	36,923
1934	3,290	26,119
1935	3,624	41,798

*One conto of reis equals one million reis, paper, Brazilian currency.

PRODUCTS OF BRAZILIAN INDUSTRY SOLD FOR PUBLIC CONSUMPTION

Product	Quantity						
	1928	1929	1930	1931	1932	1933	1934
Inner Tubes for Motor Cars	51	275	1,610	4,952	30,623	45,730	51,478
Inner Tubes for Motorcycles, Etc.	..	397	520	38	9,699	583	487
Pneumatic Tires	..	..	1,076	1,864	4,706	7,948	10,644
Pneumatic Tires for Motorcycles, Etc.	159	877	..	..	3,893	8,460	12,914
Raincoats	13,260	12,452	9,427	9,037	8,786	23,632	19,374
Garters ..... *Prs.*	..	..	..	..	..	102,000	151,000
Rubber in Sheets ..... *Tons*	..	..	..	..	..	66	167
Tubes ..... *Tons*	..	..	..	..	..	632	289
Tennis Shoes ..... *Prs.*	..	..	..	..	..	2,390,000	2,418,000

[1] From "Directoria de Estatistica Economica & Financeira do Thesouro Nacional, Ministerio da Fazenda, Brazil—1936."

SIAM

The Siamese government, it is said, contemplates establishing a rubber factory near Bangkok. This would require a total expenditure of 1,000,000 Baht (about $450,000), of which 300,000 Baht (about $135,000) would be for machinery.

Book Review

(*Continued from page 62*)

collaboration with scientists and technical experts. Paper, 440 pages, 6 by 8½ inches. Published by Chemie G.m.b.H., Berlin W.35, Germany.

This yearbook covers the development and present status of chemical apparatus and chemical plant as demonstrated at the Achema VIII held in Frankfurt a.Main, July 2 to 11, 1937, and gives an excellent idea of the variety and scope of the exhibition. The main portion of the book is divided into four parts: General, Scientific, Technical, and Industrial. The first section includes two articles by Professor Duden: "50 Years of the Association of German Chemists," and "10 Years of the Dechema." In the scientific portion are articles by Prof. O. Fuchs, "Construction of Apparatus and Chemistry;" Dr. R. Lepsius, "Synthetics at the Achema VIII;" H. Jentzen, "New Apparatus for the Continuous Manufacture of Viscose in the Cellulose Wool Industry;" and Dr. H. Witt, "Prevention of Accidents and Occupational Diseases in the Chemical Industry." This last article contains several items of interest to the rubber industry. Thus Dr. Witt mentions so-called conductive rubber used for belting, shoe soles, and floor coverings in places where dangerous charges are to be avoided. He also speaks of "de-electrisator" (Entelektrisator) which has proved useful for rubber spinning and spreading machines, among others. This apparatus, it seems, renders the air electrically conductive by ionization, thus preventing the occurrence of ignition sparks. The Technical and Industrial Sections of the yearbook fill the part of catalog and guide and are devoted to descriptions, often illustrated, of processes and apparatus shown at the Achema.

Patents and Trade Marks

MACHINERY

United States

2,082,341. **Tire Deflation Indicator.** E. F. Kelley, El Paso, Tex.

2,082,650. **Tire Pressure Indicator.** H. W. Olsen, assignor of 20% to R. H. Lawrence, both of Austin, Tex., and 40% to J. L. De Vault, Ocheltree, Kan., and G. S. Hinkle, Kilgore, Tex.

2,082,743. **Apparatus for Producing Rubber Thread.** K. R. Shaw, assignor to Easthampton Rubber Thread Co., both of Easthampton, Mass.

2,083,155. **Apparatus to Make Golf Balls.** C. W. Leguillon, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,083,211. **Device to Make Latex Articles.** S. W. Alderfer, assignor of one-half to E. D. Andrews, both of Akron, O.

2,083,289. **Tire Building Form.** H. C. Bostwick, Coventry Township, assignor to Akron Standard Mold Co., Akron, both in O.

2,084,009. **Apparatus to Make Tire Casings.** R. W. Sohl, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,084,381. **Automatic Tire Inflater.** N. D. Campbell, Hackensack, N. J.

2,084,547. **Brake Tester.** R. W. Allen, assignor to Firestone Tire & Rubber Co., both of Akron, O.

Dominion of Canada

366,965. **Apparatus for Making Sponge.** Industrial Process Corp., assignee of H. R. Minor, both of Dayton, O., U. S. A.

United Kingdom

459,010. **Footwear Mold.** D. G. Gash, Victoria, Australia.

459,022. **Renovated Tire Vulcanizer.** K. Zangl, Munich, Germany.

460,350. **Latex Concentrator.** Dunlop Rubber Co., Ltd., A. N. Ward, and G. W. Trobridge.

460,661. **Continuous Feeder.** Dunlop Rubber Co., Ltd., H. Willshaw, and T. Norcross.

Germany

646,308. **Mixer.** Francis Shaw & Co., Ltd., and R. T. Cooke, Manchester, England. Represented by B. Kugelmann, Berlin.

646,854. **Tire Groover.** R. Jebram, Berlin.

647,350. **Device to Attach Weights to Toys.** Rheinische Gummi-und Celluloid Fabrik, Mannheim-Neckarau.

PROCESS

United States

2,082,027. **Electric Device.** J. C. Rah, assignor to Delta-Star Electric Co., both of Chicago, Ill.

2,082,304. **Rubber Products.** M. J. Stam, The Hague, Netherlands.

2,082,559. **Coating Fibrous Material.** M. J. Vittengl, Fairfield, Conn., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,082,744. **Rubber Thread.** K. R. Shaw, assignor to Easthampton Rubber Thread Co., both of Easthampton, Mass.

2,083,201. **Patterned Rubber Slabs.** W. Poppe, Giessen, Germany.

2,083,684. **Rubber Coated Glove.** S. J. Burke, Dubuque, Iowa.

2,083,871. **Toilet Article.** A. E. Serewicz, Chicago, assignor of one-half to W. P. Wrisley, Park Ridge, both in Ill.

2,084,702. **Extruded Rubber Articles.** U. Pestalozza, assignor to Societa Italiana Pirelli, both of Milan, Italy.

2,084,791. **Detachable Top Lift.** J. V. Critchley, assignor to Fitz-On Sales Corp., both of Worcester, Mass.

2,084,878. **Tape.** P. Van Cleef, assignor to Van Cleef Bros., both of Chicago, Ill., a partnership composed of N., F., M., and P. Van Cleef.

Dominion of Canada

366,579. **Rubber Thread.** T. L. Shepherd, London, England.

366,883. **Rubber Product.** T. L. Shepherd, London, England.

367,074. **Rubber Article Manufacture.** Davol Rubber Co., Providence, assignee of E. L. Hanna, North Scituate, both in R. I., U. S. A.

United Kingdom

459,410. **Coating Threads.** Etablissements Flinois, Colmant & Cuvelier, Colmant & Cuvelier Successeurs Soc. Anon., Tournai, Belgium.

459,434. **Dyeing Textiles.** T. L. Shepherd, London.

459,785. **Laminated Paper Containers.** Humoco Corp., Louisville, Ky., U. S. A.

459,786. **Paper Containers.** Humoco Corp., Louisville, Ky., U. S. A.

459,966. **Pleating Paper.** Zellstoffabrik Waldhof, Mannheim, and R. Haas, Berlin, both in Germany.

460,070. **Bottle Cap Closure.** J. R. Gammeter.

460,120. **Fabrics of Agglutinated Fibers.** C. Weisleder.

460,226. **Rubber Compositions.** Carborundum Co.

460,350. **Film Evaporators.** Dunlop Rubber Co., Ltd., A. N. Ward, and G. W. Trobridge.

460,429. **Uniting Sheets of Paper.** F. K. Wertheimer, and Ferma, Ltd.

460,608. **Knitting.** Dore Et Fils.

460,744. **Spinning Artificial Threads.** K. Berndt.

Germany

646,284. **Leather Substitute.** Hessische Gummiwaren-Fabrik Fritz Peter A.G., Klein-Auheim.

646,397. **Seamless Tubes.** Wolgg & Co., Komm. Ges. a.A., Walsrode.

646,565. **Rubber Articles with Figured Surfaces.** Continental Gummi-Werke A.G., Hannover.

CHEMICAL

United States

20,411 (Reissue). **Dithiophosphate Compounds.** C. J. Romieux, Summit, and K. D. Ashley, Cranford, both in N. J., assignors to American Cyanamid Co., New York, N. Y.

2,082,278. **Moistureproofed Paper.** R. R. Ferguson, Chevy Chase, Md., assignor of one-fourth to J. G. Graham, Alexandria, Va., and one-fourth to P. V. Rogers, Chevy Chase, Md.

2,082,525. **Antioxidant.** A. W. Sloan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,083,139. **Lubricating Oil.** W. G. Black, Cleveland, O.

2,083,176. **Rubber Lubricant.** G. F. Willson, Cleveland Heights, O., assignor to Acheson Colloids Corp., New York, N. Y.

2,083,998. **Ethanolamine Compound.** G. D. Kratz, Scarsdale, and W. Jackson, New York, both in N. Y., assignors to Kaolin Processes, Inc., Elizabeth, N. J.

2,084,038. **Vulcanization of Rubber.** J. G. Lichty, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,084,042. **Rubber Derivatives.** T. C. Morris, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,084,043. **Condensation Derivatives.** T. C. Morris, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,084,131. **Age Resister.** A. M. Clifford, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,084,555. **Coloring for Rubber Goods.** E. Fischer, Frankfurt, a.M., Germany, assignor to General Aniline Works, Inc., New York, N. Y.

Dominion of Canada

366,795. **Rubberlike Product.** Beck, Koller & Co., Inc., Detroit, Mich., U. S. A., assignee of F. Bitterich, Hannover, Germany.

366,819. **Age Resisting Compound.** Imperial Chemical Industries, Ltd., London, assignee of W. Baird and M. Jones, both of Manchester, England.

366,927. **Vinylic Resin.** Societe Nobel Francaise, assignee of M. Belloc, both of Paris, France.

366,983. **Impregnating Compound.** Vega Mfg. Corp., Wilmington, Del., assignee of S. Ruben, New Rochelle, N. Y., both in the U. S. A.

367,078. **Rubber Processing.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of L. H. Howland, Nutley, N. J., U. S. A.

367,084. **Rubber Hydrochloride Sheet Material.** Marbo Products Corp., Chicago, Ill., assignee of Marsene Corp. of America, Gary, Ind., assignee of E. Gebauer-Fuelnegg, Evanston, Ill., and E. W. Moffett, Gary, Ind., all in the U. S. A.

United Kingdom

459,045. **Age Resisters.** W. Baird, and M. Jones, both of Manchester, and

Imperial Chemical Industries, Ltd., London.

459,053. **Pigment.** Coutts & Co., London, and F. Johnson, Eastbourne. (Representatives of J. Y. Johnson.) (I. G. Farbenindustrie A.-G., Frankfurt a.M., Germany.)

459,164. Artificial Filaments. British Celanese, Ltd., London, and A. J. Daly and W. G. Lowe, Spondon.

459,214. **India Rubber.** E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U. S. A.

459,217. **Phosphates.** Celluloid Corp., Newark, N. J., U. S. A.

459,334. **Plastic Compound.** Soc. of Chemical Industry in Basle, Switzerland.

459,360. **Molding Composition.** E. R. Dillehay, Glen Ellyn, Ill., U. S. A.

459,392. **Combustion Resistant Compound.** W. J. Henley's Telegraph Works Co., Ltd., London, H. A. Tunstall and B. B. Evans, both of Gravesend.

459,434. **Rubber Threads.** T. L. Shepherd, London.

459,435. **Chlorinated Rubber.** R. J. Reaney, Ottawa, Canada.

459,464. **Accelerators.** Dunlop Rubber Co., Ltd., London, D. F. Twiss and F. A. Jones, both of Birmingham.

459,544. **Heat Resisting Compound.** Bakelite, Ltd., Westminster.

459,591. **Rubber Emulsions.** O. A. Hubert, Seine, France.

459,733. **Accelerators.** Wingfoot Corp., Wilmington, Del., U. S. A.

459,948. **Latex Stabilizers.** A. Behr, Paris, France.

459,972. **Latex Foam Retarder.** Metallges. Akt.-Ges., Frankfurt a.M., Germany. (Assignees of Semperit Oesterreichisch-Amerikanische Gummiwerke Akt.-Ges., Vienna, Austria.)

460,139. **Coating Composition.** J. C. Patrick.

460,144. **Chlorinated Rubber Solutions.** A. P. Lowes and Imperial Chemical Industries, Ltd.

460,164. **Reenforcing Pigments.** New Jersey Zinc Co.

460,526. **Bitumen Rubber Aggregate Compositions.** N. H. Taylor.

460,583. **Isomerized Rubber.** Texaco Development Corp.

460,725. **Rubber Colors.** A. G. Bloxam, Soc. of Chemical Industrie in Basle, Switzerland.

460,854. **Impregnating Composition.** T. W. Ward, Ltd., and A. P. Booth.

460,939. **Plastic Compositions.** Mead Corp.

460,962. **Self-Vulcanizing Compound.** T. W. Ward, Ltd., and A. P. Booth.

Germany

646,196. **Accelerators.** I. G. Farbenindustrie A.G., Frankfurt a.M.

646,424. **Chlorinated Rubber Direct from Latex.** Consolidirte Alkaliwerke Westeregeln, Bez. Magdeburg.

646,566. **Raw Rubber.** Metallgesellschaft A.G., Frankfurt a.M.

647,161. **Imitation Sponges.** I. G. Farbenindustrie A.G., Frankfurt a.M.

647,421. **Dolls by Inflating Hard Rubber Mixes.** Koenig & Wernicke, Waltershausen, Thur.

GENERAL

United States

2,081,953. **Sound Damping Structure.** L. S. Perry, Chicago, Ill., assignor to Johns-Manville Corp., New York, N. Y.

2,082,047. **Floor Covering.** B. Bronson, assignor to Ohio Rubber Co., both of Cleveland, O.

2,082,151. **Cushion.** F. M. J. T. de Poix, assignor to Societe H. & F. de Poix & Cie, both of Rueil, France.

2,082,253. **Antiskid Chain.** C. W. McGinnis, Pittsburgh, Pa.

2,082,348. **Closet Mounting.** A. Le Tarte, Bryn Mawr, N. Y., assignor to Crest Mfg. Co., Inc., a corporation of N. Y.

2,082,434. **License Plate.** P. A. White, St. Albans, N. Y.

2,082,574. **Gauntlet Arm Protector.** J. B. Handley, Albany, N. Y.

2,082,599. **Surgical Dressing.** L. T. Sawyer, Fitchburg, Mass.

2,082,673. **Unloader and Spreader.** R. H. Williamson, Millerville, Ala.

2,082,798. **Compensating Wheeled Structure.** W. F. Herold, assignor to Bassick Co., both of Bridgeport, Conn.

2,082,821. **Window Cleaner.** R. L. Bragg, Chicago, Ill.

2,082,928. **Mat.** H. M. Wilhelmy, Shaker Heights, assignor to Ohio Rubber Co., Willoughby, both in O.

2,082,972. **Valve.** I. D. Perry, Muskegon, Mich.

2,083,003. **Pneumatic Tire.** E. G. Budd, assignor to Edward G. Budd Mfg. Co., both of Philadelphia, Pa.

2,083,037. **Phonograph Turntable Drive.** W. A. Schmittgen, assignor to General Industries Co., both of Elyria, O.

2,083,081. **Freezing Mold.** H. H. Moll, Denver, Colo.

2,083,146. **Shoe Last.** M. S. Cate, assignor to Hood Rubber Co., Inc., both of Watertown, Mass.

2,083,157. **Cutting Die.** J. H. Nelson, Belmont, assignor to Hood Rubber Co., Inc., Watertown, both in Mass.

2,083,390. **Shoe.** J. A. Murena, Jersey City, N. J.

2,083,461. **Tire.** J. Loeser, Philadelphia, Pa.

2,083,551. **Surface Cleaning Device.** L. O. Balinger, Lakewood, assignor of two-thirds to W. J. Wesseler, Cleveland, both in O.

2,083,766. **Tire and Rim.** E. E. Wittkopp, Chicago, Ill.

2,083,904. **Surgical Appliance.** W. J. Fox, assignor to J. R. Kendrick Co., Inc., both of Philadelphia, Pa.

2,084,014 and 2,084,015. **Running Board Cover.** B. Bronson, Cleveland, assignor to Ohio Rubber Co., Willoughby, both in O.

2,084,016. **Running Board Cover.** G. F. Cavanagh, Euclid, assignor to Ohio Rubber Co., Willoughby, both in O.

2,084,018. **Running Board Cover.** G. N. Edwards, assignor to Ohio Rubber Co., both of Willoughby, O.

2,084,019. **Running Board.** G. N. Edwards, assignor to Ohio Rubber Co., both of Willoughby, O.

2,084,021. **Running Board Cover.** W. E. England, assignor to Ohio Rubber Co., both of Willoughby, O.

2,084,023, 2,084,024, and 2,084,025. **Running Board Cover.** C. H. Getz, E. Cleveland, assignor to Ohio Rubber Co., Willoughby, both in O.

2,084,088. **Marker.** J. J. Jobe, Springfield, Ill.

2,084,147. **Corset.** J. J. Kispert, Hamden, assignor to I. Newman & Sons, Inc., New Haven, both in Conn.

2,084,170. **Sash Construction.** C. M. Verhagen, assignor to Adlake Co., both of Chicago, Ill.

2,084,174. **Garter.** R. B. Young, Akron, O.

2,084,513. **Abrasive Article.** F. J. Tone, assignor, by mesne assignments, to Carborundum Co., both of Niagara Falls, N. Y.

2,084,517. **Pneumatic Shoe Insert.** H. Vogel, Frankfurt a.M., Germany.

2,084,636. **Life Belt.** J. Fromm, Berlin-Schlachtensee, Germany.

2,084,720. **Waist Band.** P. Alexandre, Strasbourg, France.

2,084,784. **Embedding Abrasive in Rubber.** R. Stahl, Detroit, Mich.

2,084,804. **Anesthetizing Apparatus.** W. R. Henion, assignor to Heidbrink Co., both of Minneapolis, Minn.

2,084,948. **Elastic Shoe Protector.** L. C. De Cuir, Los Angeles, Calif.

Dominion of Canada

366,756. **Textile Fiber Working Unit.** R. W. Cutler, Boston, Mass., U. S. A.

366,825. **Running Board.** Ohio Rubber Co., assignee of G. N. Edwards, both of Willoughby, O., U. S. A.

366,862 and 366,863. **Joint.** H. C. Lord, Erie, Pa., U. S. A.

366,880. **Bottle Capper.** C. A. MacCordy, Syracuse, N. Y., U. S. A.

366,882. **Motor Vehicle Driving Device.** H. K. Peter, Liestal, Switzerland.

366,984. **Tire Carcass Cord.** Worcester Tire Fabric Co., assignee of C. R. Brownell, both of Worcester, Mass., U. S. A.

367,012. **Textile Roller Covering.** A. S. Lowry, Manchester, England.

367,014. **Tractor Lug.** F. Moening, Shepherd, Mich., U. S. A.

367,025. **Truss.** B. F. Pease, Akron, O., U. S. A.

367,081. **Motor Mounting.** Harris Products Co., Akron, assignee of M. L. Spahr, Springfield, both in O., U. S. A.

367,101. **Towel Holder.** C. E. Bardwell and F. W. Dixon, co-inventors, both of Guelph, Ont.

United Kingdom

459,019. **Joints.** J. Pfeuti and E. Schwaller, both of Berne, Switzerland.

459,029. **Joints.** Hardy, Spicer & Co., Ltd., and J. A. Daniell, both of Birmingham.

459,068. **Ball Joints.** G. & J. Weir, Ltd., and C. G. Pullin, both of Glasgow, Scotland.

459,086. **Motor Vehicles.** S. Fischer, Prague, Austria.

459,105. **Shafts.** Hardy, Spicer & Co., Ltd., and T. F., Green, both of Birmingham.

459,173. **Treads.** Dunlop Rubber Co., Ltd., London, and S. Sadler, Birmingham.

459,216. **Hinges.** L. Thiry, Huy, Belgium.

459,236. **Corsets.** M. L. Jacks, London.

459,262. **Bathing Caps.** W. W. Haffenden, London.

459,289. **Boots.** J. N. Kimpton, Newport.

459,325. **Couplings.** Roper & Wreaks, Ltd., and P. Heard, both of Sheffield.

459,331. **Compound Fabrics.** R. F. and R. A. Cruickshank, both of Vancouver, B. C., Canada.

459,338. **Hats.** N. Frankmann, and E. Haakh, both of Vienna, Austria.

459,347. **Surgical Irrigators.** W. Kirn, Hamburg, Germany.
459,377. **Perforator of Paper.** Paper Sacks, Ltd., and F. G. Robinson, Bristol.
459,392. **Cables.** Henley's Telegraph Works Co., Ltd., London, and H. A. Tunstall and B. B. Evans, both of Gravesend.
459,406. **Wool Fat Extractor.** Minerals Separation, Ltd., London.
459,425. **Screw Fans.** British Thomson-Houston Co., Ltd., London.
459,466. **Conveyers.** Huntington, Heberlein & Co., Ltd., and L. Henschel, both of London.
459,470. **Grinding Wheels.** Norton Grinding Wheel Co., Ltd., Welwyn Garden City.
459,508. **Elastic Threads.** W. Warne & Co., Ltd., J. P. Griffiths, C. R. Pinnell, F. Gladstone, and L. V. Cole, all of London.
459,513. **Inflating Valves.** Bury Rubber Co., Ltd., and E. Randle, both of Bury.
459,552. **Enameler and Glazer.** W. Boulton, Ltd., and H. H. Hall, Stoke-on-Trent.
459,632. **Vehicle Wheels.** E. Meile, Schaffhausen, Switzerland.
459,638. **Cigarette Making Machines.** Skoda Works, Prague, Austria.
459,644. **Vacuum Cleaner Silencers.** P. Linke, Berlin, Germany.
459,680. **Pipe Molds.** F. B. Cornelius, and Stanton Ironworks Co., Ltd., Stanton-by-Dale.
459,783. **Massage Appliances.** Scholl Mfg. Co., Ltd., and G. Thornton-Norris, both of London.
459,799 **Electric Lamp Stands.** Holdalite, Ltd., and G. E. Boon, both of London.
459,811. **Fuel Pumps.** General Motors Corp., Detroit, Mich., U. S. A.
459,814. **Wheel Tire Molding.** Firestone Tire & Rubber Co., Ltd., Brentford. (Firestone Tire & Rubber Co., Akron, O., U. S. A.)
459,815. **Fluid Pressure Mining Cartridges.** J. I. Graham, Birmingham, and A. E. Lance, London.
459,835. **Tires.** United States Rubber Products, Inc., New York, N. Y., U. S. A.
459,847. **Garters.** E. H. P. M. Parsons, London.
459,889. **Vehicle Opening Tops.** A. G. McFarlane, Dagenham.
459,897. **Footwear Attachments.** H. E. Jones, London.
459,905. **Mudguards.** Riley (Coventry), Ltd., S. Riley, and A. C. Player, Coventry.
459,906. **Wheel Tire Molding.** Wingfoot Corp., Wilmington, Del., U. S. A.
459,928. **Boots.** R. M. Pike, London.
459,943. **Wearing Apparel.** P. Alexandre, Strasbourg, France.
459,945. **Batteries.** A. H. Redfern and F. Maccallum, both of Birmingham.
459,954. **Mops.** P. Wehrmann and H. Hardt, both of Rhineland, Germany.
459,967. **Cans and Stoppers.** G. A. Stevenson and A. C. Griffiths, both of Swansea, Wales.
460,001. **Wheel Tire Tester.** E. Seidl.
460,036. **Cables.** Callender's Cable & Construction Co., Ltd., and J. Taylor.
460,038. **Rubber Mold and Vulcanizer.** H. Mazzeo.
460,042. **Valves.** J. Dewrance.
460,043. **Teeth Cleaning Appliances.** A. B. Aquator, Ltd.
460,101. **Corsets.** D. Abbatt.
460,125. **Vanning Machines.** C. T. Setterberg, and E. O. E. Tyden.
460,158. **Dolls.** Rheinische Gummi & Celluloid Fabrik.
460,200. **Medical Head and Body Coverings.** H. Ryner.
460,209. **Skips.** International Combustion, Ltd., and G. W. Davidson.
460,225. **Bathing Caps.** P. A. W. Davies.
460,246. **Dynamo Supports.** N. Cooke.
460,274. **Eating Appliances.** C. and G. Hughes.
460,338. **Tires.** Dunlop Rubber Co., Ltd., F. G. W. King, and L. J. Lambourn.
460,358 **Surgical Cooling Appliances.** E. Pomeranz.
460,407. **Stuffing Box Packing.** A. S. Davidson.
460,444. **Containers for Powdered Substances.** H. H. Burton and John Bull Rubber Co., Ltd.
460,462. **Brakes.** B. Dixon-Bate.
450,492. **Filling Machines.** A. Dubois.
460,526. **Floors.** N. H. Taylor.
460,529. **Valves.** A. Hutchison, and J. W. Sheardown.
460,557. **Pneumatic Tires.** Naamlooze Vennootschap Holland Rubberfabriek Radium.
460,601. **Elastic Knitted Fabrics.** Lawson Knitting Co.
460,621. **Printing Surfaces.** K. Schneider.
460,656. **Batteries.** A. H. Stevens. (USL Battery Corp.)
460,817. **Dental Trays.** J. J. V. Armstrong. (L. Kalvin.)
460,820. **Massager and Body Washer.** J. Perlzon.
460,842. **Projectiles.** L. V. S. Blacker and Dunlop Rubber Co., Ltd.
460,887. **Dentures.** C. H. Seguier-Brown.
460,919. **Non-Refillable Bottles.** L. P. Barlow.
460,938. **Seats.** A. Lorenz and A. Gaal.
460,980. **Shutter Linings.** Rubber Producers Research Association and F. G. Smith.

Germany

646,444. **Tire.** L. Zeiner, Berlin-Charlottenburg.
646,950. **Rubber Valve.** H. Muthreich, Berlin-Steglitz.
647,230. **Tire.** R. Hagemann, Braunschweig.

TRADE MARKS

United States

346,259. **XPLO.** Carbon black. United Carbon Co., Inc., Charleston, W. Va.
346,277. **Ten Crown.** Chewing gum. Ten Crown Gum Co., Inc., Naugatuck, Conn.
346,307. **Sterling.** Golf balls. United States Rubber Products, Inc., New York, N. Y.
346,316. **Esquire.** Tires and inner tubes. Norwalk Tire & Rubber Co., Inc., Norwalk, Conn.
346,360. Representation of a globe encircled by a band containing the word **"Brakeblok."** Fan belts, radiator hose, etc. American Brakeblok Corp., New York, N. Y.
346,387. Representation of a winged foot between the word: **"Goodyear."** Transparent film for wrapping, etc. Goodyear Tire & Rubber Co., Akron.
346,409. Label containing the word **"Strong's Surgical Belt, Size and Fig."** Surgical belts. Raymond's, Inc., Boston, Mass.
346,440. Representation of a wrapper with three clowns holding the words: **"Tres, En, Uno,"** and the words: **"Chiccos (Chicle Menta, Tres, En, Uno"** and **"American Chicle Company"** written above. Chewing gum. American Chicle Co., Long Island City, N. Y.
346,494. **Miracletread.** Tires and tubes. Vogue Rubber Co., Chicago, Ill.
346,523. **Alltak.** Tapes. Graeme Harrison Products, Inc., New York, N. Y.
346,524. **Papertak.** Tapes. Graeme Harrison Products, Inc., New York, N. Y.
346,525. **Tabtak.** Tapes. Graeme Harrison Products, Inc., New York, N. Y.
346,526. **Unitak.** Tapes. Graeme Harrison Products, Inc., New York, N. Y.
346,588. **Eastern.** Batteries. Eastern Battery Corp., Boston, Mass.
346,649. **Pirumite.** Hose. Pioneer Rubber Mills, San Francisco, Calif.
346,664. **Precautia.** Syringes. Marvel Co., New Haven, Conn.
346,727. **Permobond.** Rubber lined tanks. United States Rubber Products, Inc., New York, N. Y.
346,734. **Pontex.** Impregnated fiber sheet material. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
346,931. **Amazons.** Prophylactic articles. H. L. Ain, New York, N. Y.
346,951. **Lubriseal.** Liquid to wet rubber sealing elements. B. F. Goodrich Co., New York, N. Y.
346,998. **Para-Flex.** Rubber composition printing and engraving plates. Para-Flex Plate Corp., New York, N. Y.
347,024. Label containing representation of a globe, and the words: **"Atlas Tire"** above and underneath the words: **"Grip-Safe," "Silent Tread," "First Line—First Quality," "Nation-Wide Guaranty"** above the label containing the words **"4-Ply"** and underneath **"5.50-17."** Tires. Atlas Supply Co., Newark, N. J.
347,027. **A. W. Faber Radiant.** Erasers and rubber bands. A. W. Faber, Inc., Newark, N. J.
347,048. Label containing the words: **"Adams Chiclets."** Chewing gum. American Chicle Co., Long Island City, N. Y.
347,102. **Spotlight.** Golf game. L. H. White, Fairfield, Conn.
347,262. Circle partly covered by two rectangles, the smaller one containing the words: **"SS Brand."** Adhesives with rubber or latex as the base. S S Rubber Cement Co., Chicago, Ill.
347,399. **Mareng.** Compound for cementing rubber-like material. Glenn L. Martin Co., Baltimore, Md.
347,415. **Nojar.** Heels. Jenco Bros., Inc., Paterson, N. J.
347,416. **3-M.** Polishing wax for rubber tiles. Minnesota Mining & Mfg. Co., St. Paul, Minn.

A.C.S. Activities

(*Continued from page 60*)

ample indoor sports will be provided by the committee. A shooting exhibition by W. G. Hill, professional state trapshoot champion, will follow after the other sports.

Many prizes will be awarded to suc-

cessful contestants. Musical entertainment will be provided during the afternoon and evening; the banquet will be at 7 in the "Fieldston" dining hall.

Those driving from Boston should take Route 3 through Weymouth to Hanover. One mile beyond the second traffic light in Hanover, leave Route 3 taking the left-hand road marked "Brant Rock" and "Marshfield." It is a new wide road. "Fieldston" is on the left side of the road just beyond the railroad tracks in Marshfield.

Tickets are $2 each including the dinner. Reservations can be guaranteed only to those who purchase tickets in advance from G. W. Smith, secretary-treasurer, P.O. Box 11, Winchester, Mass. The festivities start at 1:30 p.m.

International Rubber Congress

THE sessions of the International Rubber Congress, held in connection with the Paris Exposition of Arts and Technics, took place in the Theatre des Champs Elysees, Avenue Montaigne, Paris, France, from July 28 to 30, inclusive. Americans who presented papers at this meeting are Walter Grote, United Carbon Co., and W. B. Wiegand, of Columbian Carbon Co. Thirty-six papers were presented, the authors and titles of which follow:

Otto Ambros, "Contributions to the Study of the Structure of Rubber in the Plant." Leo Eck, "Contribution to the History of Latex." Ernst Benzing, "Contributions to the Study of Concentrated Latex." Adolphe Blondel, "Quick Methods of Evaluating Liquid Latex." Jean Bongrand, (1) "Difficulties of Thoroughly Impregnating Textiles with Latex," (2) "Driving Belts Made from Textiles Thoroughly Impregnated with Latex." Andre Bourbon, "Production and Working of Latex." C. F. Flint and W. J. S. Naunton, "Accelerators for Latex." J. O'Marchall, "Stabilization of Latex." Elias and Guggenheim, "Stabilization of Latex; New Applications." Fritz Michl, "Latex in the Rubber Textile Industry." Paul Stamberger, "Some Properties of Rubber Latex." Arnold van Rossem, "A Colloidal Latex-Alumina System."

Paul Alexander, "The Influence of Rubber Reclaiming on the Rubber Industry in the Course of 100 Years." Paul Bary, "The Conversion Points of Rubber. Racking." Paul Bourgois, "Rubber in the Manufacture of Gas Masks." G. Genin, Lusinchi, Scherrer, "Microporous Rubber Production, Use, Applications."

Henri Leduc and Defraisse, "The Application of High-Frequency Electric Currents in the Rubber Industry." Paul Walter, "Universal Apparatus for Studying Aging." Hermann Mark, "The Elasticity of Rubber as Static Phenomenon." Konrad Oeser, "Rubber as Vibration Absorber." Walter Grote, "Testing the Uniformity of Gas Black." P. Rehbinder and M. W. Margaritow, "Variations in the Colloidal (Mechanical) Properties of Sols and Gels of Different Kinds of Rubber by the Addition in Small Quantities of Superficially Active Substances." Charles Dufraisse and Andre Etienne, "Effect of Vulcanization on Oxidation in Combination with Aging." Fernand Jacobs, "Certain Antioxygens, Their Properties with Respect to Resistance to Oxidation and Flexing Tests." J. R. Scott and B. D. Porritt, "Progress in Rubber Technology with Reference to Research and Practice." Bemelmans, "Conversion of Old Automobile Tires into Plastic Masses." Maurice Julien, "Mechanical Applications of Rubber." W. B. Wiegand, "General Theories of Reenforcing Rubber with Pigments in Connection with the Structure Molecules." Werner Esch, "Active and Inactive Blacks."

Robert Thiollet, "Application of the By-Products of the Natural Rubber Industry in the Synthetic Rubber Industry." Fernand Jacobs, "Neoprene Oil and Heat-Resistant Mixes." M. and Mme. G. Dumonthier, Peter Ovtenhoff, "Neoprene." Th. Garner, "Difficulties in the Production of Oil-Resistant Rubber." F. Kirchhof, "Types of Synthetic Rubber." Rodolfo Low, "Azo-Dyes from Rubber." Philip Schidrowitz and C. A. Redfarn, "Chlorinated Stretched Rubber." Otto Schweitzer, "Chlorinated Rubber."

Temperature Interconversion Tables

TABLES given below are abstracted from National Bureau of Standards' Miscellaneous Publication M126, which shows conversion tables from 4000° C. to the Fahrenheit temperatures and from 8000° F. to the Centigrade scale.

Table 3 (also in the report M126, but not shown here) lists the chemical elements: their atomic numbers, symbols, weights, their melting points on the international temperature scale.

Copies of Miscellaneous Publication M126, issued February 26, 1937, may be obtained from the Superintendent of Documents, Washington, D. C., at 5¢ each.

TABLE 1. DEGREES CENTIGRADE TO DEGREES FAHRENHEIT

°C	0 F	10 F	20 F	30 F	40 F	50 F	60 F	70 F	80 F	90 F
—200....	—328	—346	—364	—382	—400	—418	—436	—454	...	...
—100....	—148	—166	—184	—202	—220	—238	—256	—274	—292	—310
—0....	+32	+14	—4	—22	—40	—58	—76	—94	—112	—130
0....	32	50	68	86	104	122	140	158	176	194
100....	212	230	248	266	284	302	320	338	356	374
200....	392	410	428	446	464	482	500	518	536	554
300....	572	590	608	626	644	662	680	698	716	734
400....	752	770	788	806	824	842	860	878	896	914
500....	932	950	968	986	1004	1022	1040	1058	1076	1094
600....	1112	1130	1148	1166	1184	1202	1220	1238	1256	1274
700....	1292	1310	1328	1346	1364	1382	1400	1418	1436	1454
800....	1472	1490	1508	1526	1544	1562	1580	1598	1616	1634
900....	1652	1670	1688	1706	1724	1742	1760	1778	1796	1814
1000....	1832	1850	1868	1886	1904	1922	1940	1958	1976	1994

°C	°F
1	1.8
2	3.6
3	5.4
4	7.2
5	9.0
6	10.8
7	12.6
8	14.4
9	16.2
10	18.0

TABLE 2. DEGREES FAHRENHEIT TO DEGREES CENTIGRADE

°F	0 C	10 C	20 C	30 C	40 C	50 C	60 C	70 C	80 C	90 C
—400....	—240.0	—245.5	—251.1	—256.6	—262.2	—267.7	....	....	....	....
—300....	—184.4	—190.0	—195.5	—201.1	—206.6	—212.2	—217.7	—223.3	—228.8	—234.4
—200....	—128.8	—134.4	—140.0	—145.5	—151.1	—156.6	—162.2	—167.7	—173.3	—178.8
—100....	—73.3	—78.8	—84.4	—90.0	—95.5	—101.1	—106.6	—112.2	—117.7	—123.3
—0....	—17.7	—23.3	—28.8	—34.4	—40.0	—45.5	—51.1	—56.6	—62.2	—67.7
0....	—17.7	—12.2	—6.6	—1.1	+4.4	+10.0	+15.5	+21.1	+26.6	+32.2
100....	37.7	43.3	48.8	54.4	60.0	65.5	71.1	76.6	82.2	87.7
200....	93.3	98.8	104.4	110.0	115.5	121.1	126.6	132.2	137.7	143.3
300....	148.8	154.4	160.0	165.5	171.1	176.6	182.2	187.7	193.3	198.8
400....	204.4	210.0	215.5	221.1	226.6	232.2	237.7	243.3	248.8	254.4
500....	260.0	265.5	271.1	276.6	282.2	287.7	293.3	298.8	304.4	310.0
600....	315.5	321.1	326.6	332.2	337.7	343.3	348.8	354.4	360.0	365.5
700....	371.1	376.6	382.2	387.7	393.3	398.8	404.4	410.0	415.5	421.1
800....	426.6	432.2	437.7	443.3	448.8	454.4	460.0	465.5	471.1	476.6
900....	482.2	487.7	493.3	498.8	504.4	510.0	515.5	521.1	526.6	532.2
1000....	537.7	543.3	548.8	554.4	560.0	565.5	571.1	576.6	582.2	587.7
1100....	593.3	598.8	604.4	610.0	615.5	621.1	626.6	632.2	637.7	643.3
1200....	648.8	654.4	660.0	665.5	671.1	676.6	682.2	687.7	693.3	698.8
1300....	704.4	710.0	715.5	721.1	726.6	732.2	737.7	743.3	748.8	754.4
1400....	760.0	765.5	771.1	776.6	782.2	787.7	793.3	798.8	804.4	810.0
1500....	815.5	821.1	826.6	832.2	837.7	843.3	848.8	854.4	860.0	865.5
1600....	871.1	876.6	882.2	887.7	893.3	898.8	904.4	910.0	915.5	921.1
1700....	926.6	932.2	937.7	943.3	948.8	954.4	960.0	965.5	971.1	976.6
1800....	982.2	987.7	993.3	998.8	1004.4	1010.0	1015.5	1021.1	1026.6	1032.2
1900....	1037.7	1043.3	1048.8	1054.4	1060.0	1065.5	1071.1	1076.6	1082.2	1087.7
2000....	1093.3	1098.8	1104.4	1110.0	1115.5	1121.1	1126.6	1132.2	1137.7	1143.3

°F	°C
1	0.56
2	1.11
3	1.67
4	2.22
5	2.78
6	3.33
7	3.89
8	4.44
9	5.00
10	5.56
11	6.11
12	6.67
13	7.22
14	7.78
15	8.33
16	8.89
17	9.44
18	10.00

New Incorporations

American Rubber Products Corp., New York. Capital $5,000. A. I. Gladstone, 110 E. 42nd St. Rubber tiling and matting.

Goldsmith & Astor Rubber Co., Inc., New York. Capital $50,000. S. S. Isaacs, 31 Union Sq. W. Rubberized fabrics.

Ph-Jay Rubber Products, Inc., New York. Capital $1,000. Weisman, Celler, Quinn, Allen & Spett, 1450 Broadway. Rubber products.

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

Futures	May 29	June 26	July 3	July 10	July 17	July 24
June	20.35	19.55	.....	.....	.....	.....
July	20.38	19.58	19.33	19.03	18.83	18.44
Sept. ...	20.55	19.76	19.51	19.21	18.98	18.48
Dec.	20.65	19.93	19.66	19.33	19.11	18.61
Mar. ...	20.73	20.12	19.83	19.50	19.27	18.71
May	.....	20.26	19.97	19.66	19.40	18.81
June ...	.....	.....	20.03	19.72	19.46	18.86
Volume per week (tons) ..	8,420	15,890	18,730	8,190	7,540	12,820

THE Commodity Exchange table published here shows prices of representative future contracts on the New York market during the past two months.

Since June 26, when the price for December delivery was 19.93¢ per pound, there was a steady decline to 19.11¢ on July 17. During the past four weeks prices for delivery throughout the next year varied .70¢ per pound maximum. Trading was only moderate the early part of July, registering 18,730 tons during the week ending July 3 and very slow later in July with only 7,540 tons during the week ending July 17.

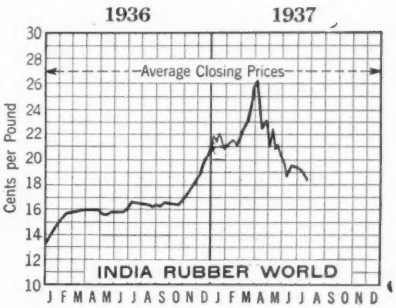
According to figures reported by the Commodity Exchange on July 17, for all countries participating in the International Rubber Regulation Agreement, with the exception of Siam and French Indo-China, the total permissible exports for the first five months of 1937 were 404,550 tons against actual shipments for the same period of 382,344 tons, or a deficiency of 22,206 tons. For the same period in 1936 the actual shipments were 285,981 tons with a deficiency under permissible of 20,116 tons.

The latest figures compiled by The Rubber Manufacturers Association place U. S. consumption in June at 51,798 long tons with May at 51,733 long tons and June, 1936, at 52,772 long tons. For the first half of 1937, U. S. consumption is reported to be 312,097 long tons, the highest on record, against 283,700 long tons during the same period in 1936.

Also, R.M.A. figures for U. S. stocks on hand were reported on June 30 at 169,646 long tons; May 31 at 172,985 long tons; June 30, 1936, at 245,544 long tons; and June 30, 1935, at 334,692 long tons.

U. S. imports of crude rubber are reported at 48,956 long tons for June; 50,840 for May; 41,835 for June, 1936; and 263,794 for the first six months of 1937, against 221,765 for the corresponding period in 1936.

Malayan gross ocean shipments for July have been estimated at 67,000 long tons against 54,800 for June. This increase is probably due to the fact that higher freight rates become effective August 1 on crude rubber shipments from Singapore.



New York Outside Market—Spot Ribbed Smoked Sheets

New York Outside Market

Factory buying remained very quiet during July, with little shipment business. Consumption appears to have fallen off somewhat since June.

No. 1 ribbed smoked sheets fluctuated between 19⅛ and 19⅜¢ per pound from June 21 to 24; then between June 28 and July 15 the price hovered between 19¢ and 19⅛¢ except on July 1 when it hit 19⅝¢. On July 16 it dropped to 18⅞¢ and on July 21, still further to 18⅝¢ per pound.

The week-end closing prices on No. 1 ribbed smoked sheets follow: June 25, 19⅛¢; July 2, 19⅛¢; July 9, 19⅛¢; and July 17, 18⅞¢ per pound.

(*Outside Market prices on page 92*)

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	June, 1937									July, 1937													
	21	22	23	24	25	26*	28	29	30	1	2	3*	5†	6	7	8	9	10*	12	13	14	15	16	17*
No. 1 Ribbed Smoked Sheet	19⅜	19¼	19⅜	19⅜	19⅜	..	19⅛	19⅜	19¼	19⅝	19⅜	..	..	19⅜	19⅛	19⅜	19⅜	..	19	19	19⅛	19⅜	18⅞	..
No. 2 Ribbed Smoked Sheet	19¼	19⅛	19⅜	19⅜	19⅜	..	19	19⅜	19⅛	19½	19⅜	..	..	19⅜	19	19⅜	18⅞	..	18⅞	18⅞	19	19⅜	18¾	..
No. 3 Ribbed Smoked Sheet	19⅛	19	18⅞	19⅜	19⅜	..	18⅞	18⅞	19	19⅜	19⅜	..	..	19⅜	18⅞	18⅞	18⅞	..	18¾	18¾	18⅞	18⅞	18⅝	..
No. 4 Ribbed Smoked Sheet	19	18⅞	18⅞	19⅜	19⅜	..	18¾	18⅞	18⅞	19¼	18⅞	..	..	18⅞	18¾	18⅞	18⅞	..	18⅝	18⅝	18¾	18⅞	18½	..
No. 1 Thin Latex Crepe...	23	22¾	22¾	23	23	..	22½	22¼	22¼	22⅝	22¼	..	..	22¼	21½	21½	21½	..	21½	21½	21⅜	21⅜	21⅛	..
No. 1 Thick Latex Crepe..	23	22¾	22¾	23	23	..	22¾	22½	22½	22⅞	22½	..	..	22½	21¾	21¾	22	..	21¾	21¾	21⅝	21⅝	21⅜	..
No. 1 Brown Crepe.....	18¾	18⅜	18⅞	18⅝	18⅝	..	18¼	18⅛	18⅛	18½	18¼	..	..	18¼	18	18	17⅞	..	17⅞	17⅞	18	18⅛	17¾	..
No. 2 Brown Crepe.....	18⅝	18¼	18⅞	18⅜	18⅜	..	18⅛	18	18	18⅜	18⅛	..	..	18⅛	17⅞	17⅞	17¾	..	17¾	17¾	17⅞	17⅞	17⅝	..
No. 2 Amber.....	18¾	18⅜	18⅞	18⅝	18⅝	..	18¼	18⅛	18⅛	18½	18¼	..	..	18¼	18	18	17⅞	..	17⅞	17⅞	18	18⅛	17¾	..
No. 3 Amber.....	18⅝	18¼	18⅞	18⅜	18⅜	..	18⅛	18	18	18⅜	18⅛	..	..	18⅛	17⅞	17⅞	17¾	..	17¾	17¾	17⅞	17⅞	17⅝	..
No. 4 Amber.....	18⅛	17¾	17⅞	17¾	17¾	..	17⅛	17	17	17⅜	17⅛	..	..	17⅛	16⅞	16⅞	16¾	..	17	17	17⅛	17⅛	17	..
Rolled Brown	16⅝	16¼	16⅛	16⅛	16⅛	..	15¾	15¼	15¼	15¼	15⅛	..	..	15½	15	15	14¾	..	15	15	14⅞	14⅛	14⅝	..

*Closed. †Holiday.

New York Outside Market (Continued)

	July, 1937					
	19	20	21	22	23	24*
No. 1 Ribbed Smoked Sheet.....	18⅞	18⅞	18⅝	18¾	18¾	..
No. 2 Ribbed Smoked Sheet.....	18⅛	18⅛	18⅛	18⅛	18⅛	..
No. 3 Ribbed Smoked Sheet.....	18⅛	18⅛	18⅛	18⅜	18	..
No. 4 Ribbed Smoked Sheet.....	18⅛	18⅛	18⅛	18⅛	17⅛	..
No. 1 Thin Latex Crepe.....	21⅛	21	20¾	20¾	20⅜	..
No. 1 Thick Latex Crepe.....	21⅜	21¼	21	21	20⅝	..
No. 1 Brown Crepe.....	17¾	17⅜	17⅛	17⅜	17	..
No. 2 Brown Crepe.....	17⅝	17¼	17	17¼	16⅞	..
No. 2 Amber.....	17¾	17⅜	17⅛	17⅜	17	..
No. 3 Amber.....	17⅝	17¼	17	17¼	16⅞	..
No. 4 Amber.....	17	16⅝	16¾	16½	16¼	..
Rolled Brown	14⅝	14½	14¼	14⅜	14⅜	..

*Closed.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Chicle Co.....	Com.	$1.00 q.	Sept. 15	Sept. 1
Firestone Tire & Rubber Co.	Pfd.	$1.50 q.	Sept. 1	Aug. 15
General Tire & Rubber Co.	Com.	$7.50 accum.	July 31	July 20
Mid-West Rubber Reclaiming Co.	Com.	$1.00 initial	July 10	June 28
Philadelphia Insulated Wire Co.	Com.	$0.50 s.	Aug. 2	July 15
Pirelli Co. of Italy, Am. Shrs. A.	Com.	$1.68¾ interim	July 7	.....
Plymouth Rubber Co..... 7%	Pfd.	$1.75 q.	July 15	July 9
Rex Hide, Inc.	Com.	$0.25 q.	June 15	.....
United States Rubber Reclaiming Co. 8%	Pfd.	$0.75	Sept. 15	Sept. 1

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption¶ Tons	U. S. Stocks Mfgrs. Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.— Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1934	469,484	453,223	355,000	47,644	134,927	62,142	1,019,100	921,141	735,391
1935	448,116	491,544	303,000	39,094	164,295	28,304	872,600	937,489	643,170
1936	490,858	575,000	223,000	56,567	78,462	26,969	855,638	1,035,028	455,409
1936									
January ...	31,292	48,631	296,683	43,870	162,107	31,195	62,700	**85,317	569,826
February ..	35,219	36,841	293,631	46,532	157,028	38,421	63,993	71,178	572,323
March	37,451	42,813	284,561	58,935	147,712	29,322	69,228	80,360	590,475
April	40,370	52,031	277,478	47,678	140,404	32,200	60,005	85,175	527,178
May	35,598	50,612	262,415	48,860	130,590	26,687	68,809	90,754	501,582
June	41,835	52,772	245,544	47,228	122,285	28,260	66,459	88,680	532,992
July	35,880	48,250	235,850	60,343	113,386	29,493	83,831	86,704	490,074
August ...	42,562	46,777	230,167	63,597	108,215	28,289	71,181	81,819	468,238
September .	48,386	46,449	233,336	62,240	103,962	26,936	72,295	82,660	490,602
October ...	40,920	49,637	224,000	67,825	96,625	24,593	81,726	91,397	450,560
November..	44,296	50,433	211,480	73,691	88,781	26,761	78,329	88,140	436,657
December..	57,049	49,753	223,000	56,567	78,462	26,969	77,084	92,641	455,409
1937									
January ...	32,820	50,818	204,201	55,096	71,062	36,365	71,544	92,920	412,404
February ..	43,289	51,887	195,080	53,538	63,760	42,132	70,535	93,037	398,369
March	52,039	54,064	191,928	56,994	52,077	42,485	102,319	104,690	437,539
April	35,850	51,797	174,934	72,530	48,748	38,812	89,710	93,173	391,015
May	50,840	51,733	172,985	58,542	46,628	34,234	86,818	.....	374,980
June	48,956	51,798	169,646	57,215	.....	.....	.....	.....	.....

* Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, and afloat. ¶Corrected to 100% from estimate of reported coverage. **Not including additional absorption from U.K. manufacturers' stocks for any month during 1936. The figure will be included in yearly total.

CRUDE rubber consumption by United States manufacturers during June is estimated at 51,798 long tons, an increase of less than 1% over the 51,733 long tons consumed in May, but 1.8% under June, 1936, when consumption was 52,772 (revised) long tons, according to the R. M. A.

Gross imports of crude rubber for June are said to be 48,956 long tons, a decrease of 3.7% under the May figure of 50,840 long tons, but 17% over the 41,835 long tons imported in June, 1936.

Domestic stocks of crude rubber on hand June 30 total 169,646 long tons, against May 31 stocks of 172,985 long tons and 245,544 (revised) long tons on hand June 30, 1936.

Crude rubber afloat to United States ports as of June 30 is estimated at 57,215 long tons, compared with 58,542 long tons afloat on May 31 and 47,228 long tons afloat on June 30, 1936.

London and Liverpool Stocks

Week Ended	Tons London	Tons Liverpool
July 3.....	21,960	21,087
July 10.....	21,571	20,604
July 17.....	21,666	19,979
July 24.....	21,746	20.036

RECLAIMED RUBBER

RECLAIMED rubber consumption in June is reported at 14,414 tons against 14,693 tons in May. For the first six months this year consumption has been 89,343 tons, or 40.5% over that for the corresponding period in 1936 of 63,590 tons. Stocks on hand at the end of June were 14,535 tons.

Production in June was said to be 16,052 tons, or 11% greater than the consumption during that period. In July the demand has been quite steady.

Prices on some items have declined slightly, auto tire reclaims dropping ¼¢ per pound and a recession of ½¢ applied to standard shoe, compounded tube, and red tube reclaims. Other basic types of reclaim are unchanged.

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption†	Consumption % to Crude	U. S. Stocks*	Exports
1934	110,010	100,597	22.3	23,079	4,737
1935	122,140	113,530	22.9	25,069	5,383
1936	150,571	141,486	24.6	19,000	7,085
1937					
January	15,129	14,450	28.4	18,822	857
February	15,192	14,578	28.1	18,490	946
March	14,462	15,601	28.9	16,450	901
April	13,884	15,607	30.1	14,046	1,140
May	15,793	14,693	28.4	14,647	890
June	16,052	14,414	27.8	14,535	...

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage.
Compiled by The Rubber Manufacturers Association, Inc.

RUBBER SCRAP

THE consumption of all grades of rubber scrap is at a peak as the reclaimers are continuing strong on production. The market was quiet in July. No change is looked for during August, but an increased consumption is expected in the fall to take care of increasing capacity of reclaimers. Prices remained the same as on July 1.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

July 27, 1937

		Prices
Boots and Shoes		
Boots and shoes, black	lb.	$0.01¼/$0.01⅜
Colored	lb.	.00⅞/ .01
Untrimmed arctics	lb.	.01 / .01¼
Inner Tubes		
No. 1, floating	lb.	.14½/ .15
No. 2, compound	lb.	.06¼/ .06⅜
Red	lb.	.06¼/ .06⅜
Mixed tubes	lb.	.06 / .06¼
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	ton	15.00 /16.00
Beadless	ton	22.50 /23.00
Auto tire carcass	ton	30.00 /33.00
Black auto peelings	ton	24.00 /26.00
Solid		
Clean mixed truck	ton	32.00 /33.00
Light gravity	ton	42.00 /45.00
Mechanicals		
Mixed black scrap	ton	25.00 /30.00
Hose, air brake	ton	31.00 /33.00
Garden, rubber covered	ton	16.50 /18.00
Steam and water, soft	ton	16.50 /18.00
No. 1 red	lb.	.04¼/ .04½
No. 2 red	lb.	.02¾/ .03
White druggists' sundries	lb.	.04½/ .05
Mechanical	lb.	.02½/ .03
Hard Rubber		
No. 1 hard rubber	lb.	.15 / .17

Tire Life in the U. S.

The length of time tires remained in service has been estimated as follows for years since 1910, according to Circular No. 3,644, Leather and Rubber Division, United States Department of Commerce.

TIRE LIFE IN YEARS

1910.....	0.730	1924.....	1.570
1911.....	0.858	1925.....	1.581
1912.....	0.786	1926.....	1.770
1913.....	0.805	1927.....	1.655
1914.....	0.722	1928.....	1.550
1915.....	0.768	1929.....	1.848
1916.....	0.762	1930.....	2.465
1917.....	0.712	1931.....	2.417
1918.....	0.893	1932.....	2.689
1919.....	0.933	1933.....	2.427
1920.....	1.284	1934.....	2.566
1921.....	1.486	1935.....	2.725
1922.....	1.296	1936.....	2.692
1923.....	1.508		

New York Quotations

July 27, 1937

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6¼/ 6½
Acid	1.18-1.22	7¼/ 7½
Shoe		
Standard	1.56-1.60	7 / 7¼
Tube		
No. 1 Floating	1.00	19 /19¼
Compounded	1.10-1.12	10½/11
Red Tube	1.15-1.30	10½/11
Miscellaneous		
Mechanical Blends	1.25-1.50	4¼/ 5
White	1.35-1.50	15 /15½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

ADVERTISING PAGES REMOVED

COMPOUNDING INGREDIENTS

IN GENERAL the demand has been slow during July largely owing to the usual seasonal decline. Indications are that business will continue quiet during August, but a recurring rise in activity is expected in the fall.

CARBON BLACK. Approaching inventories in the rubber industry caused considerable slackening in sales. Business is expected to remain quiet during August. This will afford an opportunity to build up stocks to a more satisfactory level. Prices remain unchanged.

LITHARGE. Demands were light and spotty. The trade watched the metal market closely, but there has been no change in domestic metal prices yet. Prices continued without change.

LITHOPONE. In view of the increase in contract prices July 1, buyers were well stocked, having taken out all of the undelivered balances on the contracts that expired at the end of June. July buying was very light. There has been no change in prices since July 1.

RUBBER CHEMICALS. Sales have reacted to seasonal decline, and it is expected that the market will remain quiet during August. Prices will probably continue steady during the next quarter.

RUBBER SOLVENTS. Demands were moderated as tire manufacturers prepared for their inventories. There has been no change in the price structure recently.

RUBBER SUBSTITUTES. Demand has been steady with no change expected for August. Prices have been firm and probably will remain the same in August.

STEARIC ACID. Quotations remained at the same level, and business was on a moderate scale. A firmer tone prevailed toward the end of the month as the market for basic material appeared to have an upward trend.

TITANIUM PIGMENTS. July demand was lower than in June. Contract buying was heavy before the first of the month, owing to the price advances effective July 1. The basic price for the compound pigments is now 5⅞¢ per pound.

ZINC OXIDE. Prices remained unchanged after the schedule increase at the first of the month. The buying trade was well stocked on purchases made prior to the recent advance in prices. There was little activity in the market, and the next few weeks should remain slow.

New York Quotations

July 27, 1937

Prices Not Reported Will Be Supplied on Application

Abrasive		
Pumicestone, powdered	lb.	$0.03 /$0.03½
Rottenstone, domestic	lb.	.03 / .03½
Silica, 15	ton	38.00
Accelerators, Inorganic		
Lime, hydrated	ton	20.00
Litharge (commercial)	lb.	.08½
Accelerators, Organic		
A-1	lb.	.26
A-5-10	lb.	.34
A-10	lb.	.34
A-11	lb.	.57
A-19	lb.	.57
A-32	lb.	.72
A-77	lb.	.47
A-100	lb.	.47
A-433	lb.	.50
Accelerator 49	lb.	.42
808	lb.	
833	lb.	
Acrin	lb.	
Aldehyde ammonia	lb.	
Altax	lb.	
B-J-F	lb.	
Beutene	lb.	
Butyl Zimate	lb.	
C-P-B	lb.	
Captax	lb.	
Crylene	lb.	
Paste	lb.	
D-B-A	lb.	
Di-Esterex	lb.	
Di-Esterex-N	lb.	
DOTG	lb.	.47
D.O.T.T.U.	lb.	
DPG	lb.	.37
El-Sixty	lb.	.57
Ethylideneaniline	lb.	
Formaldehyde P.A.C.	lb.	
Formaldehydeaniline	lb.	
Formaldehyde-para-toluidine	lb.	
Guantal	lb.	.40 / .50
Hepteen	lb.	
Base	lb.	
Hexamethylenetetramine	lb.	
Lead oleate, No. 999	lb.	.14
Witco	lb.	.15
Methylenedianilide	lb.	
Monex	lb.	
Novex	lb.	
O. N. V.	lb.	
Ovac	lb.	
Pip-Pip	lb.	2.50
Pipsolene	lb.	1.75
R-2	lb.	1.65
Base	lb.	3.60
R-23	lb.	.57
R & H 50-D	lb.	
Safex	lb.	
Super-sulphur No. 1	lb.	
No. 2	lb.	
Tetrone A.	lb.	
Thiocarbanilide	lb.	
Thionex	lb.	
Trimene	lb.	
Base	lb.	
Triphenyl guanidine (TPG)	lb.	
Tuads	lb.	
Ureka	lb.	$0.65
Blend B	lb.	.65
C	lb.	.60
Vulcanex	lb.	
Vulcanol	lb.	
Vulcone	lb.	
Z-B-X	lb.	
Z-88-P	lb.	.51
Zenite	lb.	
A	lb.	
B	lb.	
Zimate	lb.	
ZML	lb.	
Activator		
Barak	lb.	
Age Resisters		
AgeRite Alba	lb.	
Exel	lb.	
Gel	lb.	
Hipar	lb.	
HP	lb.	
Powder	lb.	
Resin	lb.	
D	lb.	
Syrup	lb.	
White	lb.	
Akroflex C	lb.	
Albasan	lb.	
Antox	lb.	
B-L-E	lb.	
B-X-A	lb.	
Copper Inhibitor X-872	lb.	
Flectol B	lb.	.54
H	lb.	.54
White	lb.	1.00
M-U-F	lb.	
Neozone (standard)	lb.	
A	lb.	
C	lb.	
D	lb.	
E	lb.	
Oxynone	lb.	.68
Parazone	lb.	
Perflectol	lb.	.67
Permalux	lb.	
Santoflex A	lb	
B	lb.	.54
Solux	lb.	
Thermoflex	lb.	
A	lb.	
V-G-B	lb.	
Alkalies		
Caustic Soda, flake, columbia (400 lb. drums)	100 lbs.	2.70 /$3.30
liquid, 50%	100 lbs.	$1.95
solid (700 lb. drums)	100 lbs.	2.30 /$2.90
Antiscorch Materials		
A-F-B	lb.	
Antiscorch T	lb.	
Cumar RH	lb.	.09
Retarder B	lb.	
W	lb.	
T-J-B	lb.	
U.T.B.	lb.	
Antisun Materials		
Heliozone	lb.	
Sunproof	lb.	
Brake Lining Saturant		
B. R. T. No. 3	lb.	.0165/ .0175
Colors		
BLACK		
Lampblack (commercial)	lb.	.15
BLUE		
Brilliant	lb.	
Prussian	lb.	.37½
Toners	lb.	.08 /3.50
BROWN		
Mapico	lb.	.13
GREEN		
Brilliant	lb.	
Chrome, light	lb.	
medium	lb.	
oxide (freight allowed)	lb.	.21
Dark	lb.	
Guignet's, Easton, Pa., bbls.	lb.	.70
Light	lb.	
Toners	lb.	.85 / 3.50
ORANGE		
Lake	lb.	
Toners	lb.	.40 / 1.60
ORCHID		
Toners	lb.	1.50 / 2.00
PINK		
Toners	lb.	1.50 / 4.00
PURPLE		
Permanent	lb.	
Toners	lb.	.60 / 2.00
RED		
Antimony		
Crimson, 15/17%	lb.	.50
R. M. P. No. 3	lb.	.46
Sulphur free	lb.	.48
Golden 15/17%	lb.	.28
7-A	lb.	.35
Z-2	lb.	.22
Aristj	lb.	1.75
Cadmium, light (400 lb. bbls.)	lb.	.75
Chinese	lb.	

Crimson	lb.	
Mapico	lb.	$0.09¼
Medium	lb.	
Rub-Er-Red, Easton, Pa., bbls.	lb.	.09¼
Scarlet	lb.	
Toners	lb.	.08 /$2.00

WHITE

Lithopone (bags)	lb.	.04⅜/ .04⅝
Albalith Black Label-11	lb.	.04⅜/ .04⅝
Astrolith (5-ton lots)	lb.	.04⅜/ .04⅝
Azolith	lb.	.04⅜/ .04⅝
Cryptone-19	lb.	.05⅞/ .06⅛
CB-21	lb.	.05⅞/ .06⅛
ZS No. 20	lb.	.09 / .09¼
No. 86	lb.	.09 / .09¼
Sunolith (5-ton lots)	lb.	.04⅜/ .04⅝
Ray-Bar	lb.	
Ray-Cal	lb.	
Rayox	lb.	
Titanolith (5-ton lots)	lb.	.05⅞/ .06⅛
Titanox-A (50-lb. bags)	lb.	.16 / .17
B (50-lb. bags)	lb.	.05⅞/ .06⅛
B-30 (50-lb. bags)	lb.	.05⅞/ .06⅛
C (50-lb. bags)	lb.	.05⅞/ .06⅛
Ti-Tone	lb.	
Zinc Oxide		
Anaconda, Green Seal		
No. 333	lb.	.08 / .08½
Lead Free No. 352	lb.	.07½/ .08
No. 570	lb.	.07½/ .08
No. 577	lb.	.07½/ .08
Red Seal No. 222	lb.	.07½/ .08
U.S.P. No. 777 (bbls.)	lb	.09½/ .09¾
White Seal No. 555	lb.	.08½/ .09
Azo ZZZ-11	lb.	.06¼ / .06½
44	lb.	.06¼ / .06½
55	lb.	.06¼ / .06½
66	lb.	.06¼ / .06½
French Process, Florence White Seal-7 (bbls.)	lb.	.08½/ .08¾
Green Seal-8	lb.	.08 / .08¼
Red Seal-9	lb.	.07½/ .07¾
Kadox, Black Label-15	lb.	.06½/ .06¾
Blue Label-16	lb.	.06½/ .06¾
Red Label-17	lb.	.06½/ .06¾
No. 25	lb.	.07½/ .07¾
Horse Head Special 3	lb.	.06¼/ .06½
XX Red-4	lb.	.06¼/ .06½
23	lb.	.06¼/ .06½
72	lb.	.06¼/ .06½
78	lb.	.06¼/ .06½
80	lb.	.06½/ .06¾
103	lb.	.06½/ .06¾
110	lb.	.06½/ .06¾
St. Joe (lead free)		
Black Label	lb.	.06¼/ .06½
Green Label	lb.	.06¼/ .06½
Red Label	lb.	.06¼/ .06½
U.S.P. X	lb.	.09 / .09¼
White Jack	lb.	.09 / .09¼

YELLOW

Cadmolith (cadmium yellow), 400 lb. bbls.	lb.	.50
Lemon	lb.	
Mapico	lb.	.09½
Toners	lb.	2.50

Dispersing Agents

Bardol	lb.	.0215/ .024
Darvan	lb.	
Santomerse	lb.	.17

Factice

Amberex	lb.	.19
Brown	lb.	.09 / .16
Neophax A.	lb.	.13
B.	lb.	.13
Fac-Cel B	lb.	.18
C.	lb.	.18
White	lb.	.10 / .17

Fillers, Inert

Asbestine, c.l., f.o.b. mills	ton	15.00
Barytes	ton	30.00 /36.00
f.o.b. St. Louis (50 lb. paper bags)	ton	22.85 /23.05
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip	lb.	.03½ .05
Calcene	ton	37.50 /45.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	
No. 3	ton	
Magnesia, calcined, heavy	lb.	.04
Carbonate L.C.L.	lb.	.07 / .09
Pyrax	ton	
Whiting		
Columbia Filler	ton	9.00 /14.00
Domestic	100 lbs.	
Guilders	100 lbs.	
Hakuenka	lb.	
Paris white, English cliff-stone	100 lbs.	
Southwark Brand, Commercial	100 lbs.	
All other grades	100 lbs.	
Suprex, white extra light	ton	45.40 /60.00
heavy	ton	45.40 /60.00
Witco, c.l.	ton	7.00

Fillers for Pliability

P-33	lb.	
Thermax	lb.	
Velvetex	lb.	$0.03 /$0.04½

Finishes

IVCO lacquer, clear	gal.	2.15 / 2.50
colors	gal.	2.60 / 4.70
Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00

Flock

Cotton flock, dark	lb.	.12 / .13
dyed	lb.	.50 / .85
white	lb.	.14½/ .20
Rayon flock, colored	lb.	1.25 / 2.00
white	lb.	1.00 / 1.25

Latex Compounding Ingredients

Accelerator 85	lb.	
89	lb.	
122	lb.	
552	lb.	
Alphasol-OS	lb.	.60
Antox, Dispersed	lb.	
Aquarex A	lb.	
D	lb.	
F	lb.	
Areskap No. 50	lb.	.20
No. 100, dry	lb.	.43
Aresket No. 240	lb.	.18
No. 250, alcoholic	lb.	.22
No. 300, dry	lb.	.46
Aresklene No. 375	lb.	.40
No. 400, dry	lb.	.56
Black No. 25, Dispersed	lb.	.22 / .40
Catalpo	ton	
Color Pastes, Dispersed	lb.	
Dispersex No. 15	gal.	.80 / .95
No. 20	gal.	.60 / .75
Emo, brown	lb.	.16
white	lb.	.16
Factice Compound, Dispersed	lb.	.40
Heliozone, Dispersed	lb.	
Igepon A	lb.	
MICRONEX, Colloidal	lb.	.06 / .07
Nekal BX (dry)	lb.	
Palmol	lb.	.10
Paradors	lb.	
R-23	lb.	.57
S.1 (400 lb. drums)	lb.	.65
Santomerse	lb.	.17
Stablex A	lb.	.90 / 1.10
B	lb.	.65 / .90
C	lb.	.40 / .50
Sulphur, Dispersed	lb.	.10 / .15
No. 2	lb.	
T.1. (400 lb. drums)	lb.	.40
Tepidone	lb.	
Vulcan Colors	lb.	
Zinc oxide, Colloidal	lb.	
Dispersed	lb.	.09 / .15

Mineral Rubber

B. R. C. No. 20	lb.	.009 / .01
Black Diamond	ton	25.00
Genasco Hydrocarbon, granulated, (fact'y)	ton	
solid	ton	
Gilsonite Hydrocarbon (factory)	ton	
Hydrocarbon, hard	ton	
soft	ton	
Parmr Grade 1	ton	25.00
Grade 2	ton	25.00
Pioneer	ton	
265°	ton	

Mold Lubricants

Lubrex	lb.	.25 / .30
Mold Paste	lb.	.18
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone	ton	25.00 /35.00

Oil Resistant

AXF	lb.	

Reclaiming Oils

B. R. V.	lb.	.03 / .0325
S. R. O.	lb.	.0175/ .0185

Reenforcers

Carbon Black		
Aerfloted Arrow Specification Black	lb.	.0535/ .0825
Arrow Compact Granulized Carbon Black	lb.	
"Certified" Heavy Compressed, Cabot	lb.	
Spheron	lb.	
Continental Dustless	lb.	.0445/ .0535
Compressed	lb.	.0445/ .0535
Uncompressed	lb.	.0445/ .0535
Disperso, c.l.	lb.	.0445/ .0535
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed, c.l., f.o.b., New Orleans, La., Galveston or Houston, Tex.	lb.	$0.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Excello, c.l., f.o.b. Gulf ports	lb.	.0445/$0.0645
delivered New York	lb.	.0505/ .0705
l.c.l., delivered New York	lb.	.07 / .09
Fumonex, c.l., f.o.b. works	lb.	.03
ex-warehouse	lb.	.04½
Gastex	lb.	.03 / .07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmobile 66, c.l., f.o.b New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
MICRONEX Beads, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Mark II, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Standard, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
W-5, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
W-6, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Pelletex	lb.	.03 / .07
Supreme, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0505/ .0705
l.c.l. delivered New York	lb.	.07 / .09
"WYEX BLACK"	lb.	
Carbonex	lb.	.029 / .0315
Carbonex "S"	lb.	.0315/ .034
Clays		
Aerfloted Paragon (bulk)	ton	6.50
Suprex No. 1 Selected	ton	10.00
No. 2 Standard	ton	9.00
China	ton	17.50 /20.00
Dixie	ton	
Junior	ton	
McNamee	ton	
Par	ton	
Witco	ton	9.00
Cumar EX	lb.	.035

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Curodex 19	lb.	2.75
188	lb.	3.50
198	lb.	4.50
Paradors	lb.	
Rodo No. C	lb.	
No. 10	lb.	

Rubber Substitutes

Black	lb.	.07¾/ .13½
Brown	lb.	.08½/ .14
White	lb.	.09½/ .15¼

Softeners

Burgundy pitch	lb.	.06
Cycline oil	gal.	.20
Palm oil (Witco)	lb.	.065
Pine tar	gal.	

(Continued on page 92)

British Institution of the Rubber Industry

The following papers have been published in Vol. XII, Nos. 1-5, of the "I.R.I. Transactions":

"Patents and the Rubber Industry," H. Douglas Elkington.

"Indiarubber; Man's Modifications of a Natural Product," Dr. D. F. Twiss.

"The Investigation of White Spots on Proofings," W. Longmuir.

"Fatigue in Rubber," A. B. D. Cassie, Maldwyn Jones and Dr. W. J. S. Naunton.

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COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICE

Futures	May 29	June 26	July 3	July 10	July 17	July 24
June	12.75	.....	.....	.....	.....	.....
July	12.80	12.26	12.01	12.30	.....	.....
Sept.	12.76	12.25	12.00	12.36	11.97	11.17
Dec.	12.71	12.24	11.98	12.32	11.95	11.13
Mar.	12.80	12.31	12.03	12.36	12.03	11.19
May	12.83	12.32	12.06	12.40	12.06	11.25
June	.....	.....	.....	.....	12.07	11.24

New York Quotations

July 27, 1937

Drills		
38-inch 2.00-yard	yd.	$0.15
40-inch 3.47-yard		.12½
50-inch 1.52-yard		.20½
52-inch 1.85-yard		.17¾
52-inch 1.90-yard		.17½
52-inch 2.20-yard		.15⅞
52-inch 2.50-yard		.14
59-inch 1.85-yard		.17¾
Ducks		
38-inch 2.00-yard D. F.	yd.	.15
40-inch 1.45-yard S. F.		.20¾
51½-inch 1.35-yard D. F.		.22¼
72-inch 1.05-yard D. F.	.30	/.31½
72-inch 17.21-ounce		.34
MECHANICALS		
Hose and belting	lb.	.29
TENNIS		
52-inch 1.35-yard	yd.	.27½
Hollands		
GOLD SEAL AND EAGLE		
20-inch No. 72	yd.	.11
30-inch No. 72		.20
40-inch No. 72		.22
RED SEAL AND CARDINAL		
20-inch	yd.	.09⅛
30-inch		.18
40-inch		.19¼
50-inch		.27
Osnaburgs		
40-inch 2.34-yard	yd.	.13¼
40-inch 2.48-yard		.12½
40-inch 2.56-yard		.10⅝
40-inch 3.00-yard		.10⅛
40-inch 7-ounce part waste		.09¾
40-inch 10-ounce part waste		.14
37-inch 2.42-yard		.13
Raincoat Fabrics		
COTTON		
Bombazine 60 x 64	yd.	.09¾
Plaids 60 x 48		.11¾
Surface prints 60 x 64		.12½
Print cloth, 38½-inch, 60 x 64		.06¼
SHEETINGS, 40-INCH		
48 x 48, 2.50-yard	yd.	.11
64 x 68, 3.15-yard		.11
56 x 60, 3.60-yard		.09
44 x 40, 4.25-yard		.07
SHEETINGS, 36-INCH		
48 x 48, 5.00-yard	yd.	.06¼
44 x 40, 6.15-yard		.04¾
Tire Fabrics		
BUILDER		
17¼ ounce 60" 23/11 ply Karded peeler	lb.	.35½
CHAFER		
14 ounce 60" 20/8 ply Karded peeler	lb.	.35½
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.35
CORD FABRICS		
23/5/3 Karded peeler, 1 1/16" cotton	lb.	.36½
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.34½
23/5/3 Karded peeler, 1¼" cotton	lb.	.45
23/5/3 Combed Egyptian	lb.	.55
LENO BREAKER		
8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.37½

THE accompanying table of week-end closing prices on the New York Cotton Exchange shows the week-end change of representative futures during July and closing prices on May 29 and June 26.

Spot middlings sold at 13.30¢ per pound on May 24 and at 12.44¢ on June 20. The price rose steadily to 12.76¢ on June 26 and on June 30 it dropped to 12.54¢ where it hovered till July 7 when at 12.62¢ it started a rise to 13.05¢ on July 9 with little fluctuation until July 16 when it dropped to 12.52¢ and remained to close at 12.51¢ per pound on July 19.

The market fell rapidly to 11.80¢ on July 23, the lowest since August, 1936. This drop happened when a suggestion was reported to have come from a White House spokesman that this year's cotton crop would be 14,500,000 bales and when the president was quoted as anxious for greater control over agriculture.

Average prices at 10 designated southern markets trailed the New York middlings prices at from .17¢ to .21¢ except on June 23 and 30 when the differential was .11¢ and .12¢ respectively, and on July 10 the variation was .25¢ per pound.

The acreage for this season has been estimated at approximately 34,000,000 acres, which for the year should produce between 13,000,000 and 14,000,000 bales of 478 pounds net or 500 pounds gross weight per bale. The Bureau of the Census, Department of Commerce, recently reported total consumption of all cottons, exclusive of linters, in domestic mills at 681,394 bales during June, a new high June consumption figure since 1933 when the total was reported as 698,000 bales.

A current cotton crop of 14,500,000 bales would make this year the largest since 1931 when the yield was 16,629,000 running bales. Previous to the

(*Continued on page 92*)

Cotton Production in the United States[1]

Herein is shown the production of cotton in the United States from the crops of 1899 to 1936, as ascertained from the reports of ginners. The statistics given below will be associated with others on the production, consumption, imports, exports, and stocks of cotton, and incorporated in the annual cotton report to be published after the close of the cotton year by the Bureau of the Census, U. S. Department of Commerce.

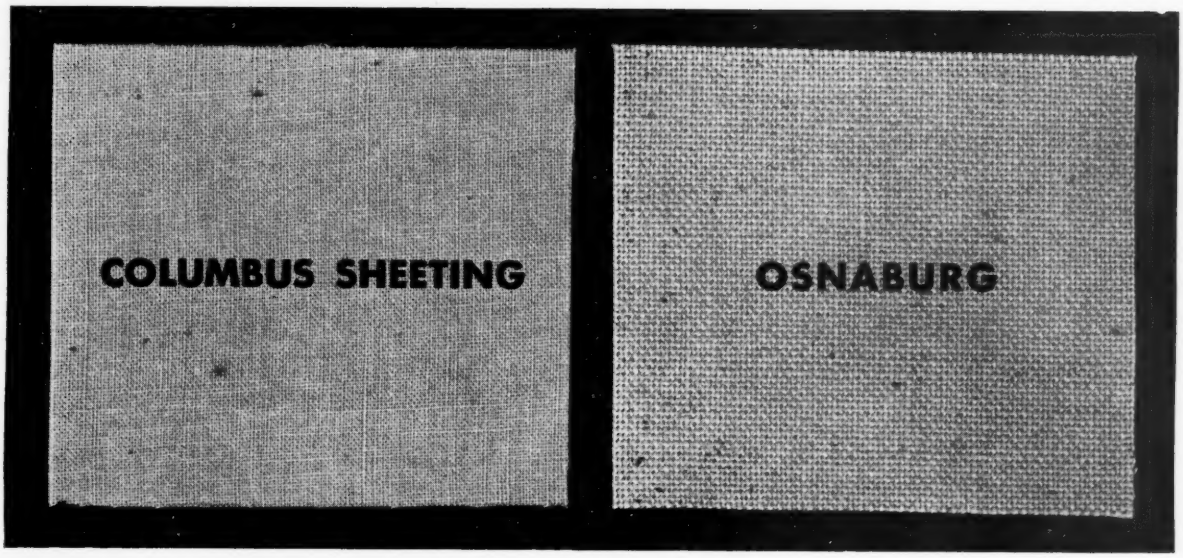
COTTON AND LINTER PRODUCTION: CROPS OF 1899—1936

	Cotton (Exclusive of Linters)						Linters	
			Running Bales					
				Upland				
Growth Year	Running Bales Counting Round as Half Bales	Equivalent 500-Pound Bales	Total	Square*	Round	Sea-Island	Running Bales	Equivalent 500-Pound Bales
1936	12,141,376	12,398,882	12,282,507	11,999,356	282,262	889	†	†
1935	10,420,346	10,638,391	10,567,472	10,273,044	294,253	175	876,215	1,088,766
1934	9,472,022	9,636,559	9,570,652	9,373,368	197,260	24	805,083	1,000,964
1933	12,664,019	13,047,262	12,967,715	12,360,313	607,392	10	800,526	982,322
1932	12,709,647	13,001,508	13,072,436	12,546,842	725,579	15	741,401	911,884
1931	16,628,874	17,095,594	16,939,559	16,318,163	621,370	26	875,667	1,067,381
1930	13,755,518	13,931,597	14,017,656	13,493,359	524,277	20	823,944	986,430
1929	14,547,791	14,824,861	14,833,904	14,261,670	572,227	7	1,038,170	1,241,355
1928	14,296,549	14,477,874	14,633,802	13,959,274	674,506	22	1,085,766	1,282,061
1927	12,783,112	12,956,043	13,058,251	12,507,795	550,277	179	875,121	1,016,375
1926	17,755,070	17,977,374	18,086,963	17,423,154	663,786	23	1,041,864	1,157,861
1925	16,122,516	16,103,679	16,298,076	15,946,937	351,121	18	1,044,495	1,114,877
1924	13,639,399	13,627,936	13,796,561	13,482,225	314,325	11	857,962	897,375
1923	10,170,694	10,139,671	10,291,847	10,048,755	242,307	785	639,540	668,600
1922	9,729,306	9,762,069	9,815,397	9,638,090	172,182	5,125	590,537	607,779
1921	7,977,778	7,953,641	8,039,673	7,912,555	123,791	3,327	382,375	397,752
1920	13,270,970	13,439,603	13,374,237	13,165,835	206,534	1,868	429,005	440,313
1919	11,325,532	11,420,763	11,382,684	11,261,463	114,305	6,916	595,093	607,969
1918	11,906,480	12,040,532	11,983,582	11,777,170	154,204	52,208	910,236	929,516
1917	11,248,242	11,302,375	11,342,780	11,061,085	189,076	92,619	1,096,422	1,125,719
1916	11,363,915	11,449,930	11,460,084	11,150,186	192,339	117,559	1,300,163	1,330,714
1915	11,068,173	11,191,820	11,124,031	10,920,471	111,716	91,844	944,640	931,141
1914	15,905,840	16,134,930	15,934,649	15,795,377	57,618	81,654	832,401	856,900
1913	13,982,811	14,156,486	14,032,792	13,855,267	99,962	77,563	631,153	638,881
1912	13,488,539	13,703,421	13,529,303	13,373,998	81,528	73,777	602,324	600,594
1911	15,553,073	15,692,701	15,603,850	15,383,003	101,554	119,293	556,276	557,575
1910	11,568,334	11,608,616	11,624,777	11,421,522	112,887	90,368	397,628	397,072
1909	10,072,731	10,004,949	10,148,076	9,902,595	150,690	94,791	313,478	310,433
1908	13,086,005	13,241,799	13,207,157	12,870,994	242,305	93,858	346,126	345,507
1907	11,057,822	11,107,179	11,157,096	10,871,652	198,549	86,985	268,060	268,282
1906	12,983,201	13,273,809	13,117,310	12,791,541	268,219	57,550	322,064	321,689
1905	10,495,105	10,575,017	10,635,023	10,242,648	279,836	112,539	230,497	229,539
1904	13,451,337	13,438,012	13,599,412	13,198,944	296,151	104,317	245,973	241,942
1903	9,819,969	9,851,129	10,205,073	9,359,472	770,208	75,393	195,752	194,486
1902	10,588,250	10,630,945	11,078,882	9,992,665	981,264	104,953	196,223	196,223
1901	9,582,520	9,509,745	9,954,945	9,132,215	744,851	77,879	166,026	166,026
1900	10,102,102	10,123,027	10,486,148	9,629,762	768,092	88,294	143,500	143,500
1899	9,393,242	9,345,391	9,645,974	9,043,231	505,464	97,279	114,544	114,544

*Includes 17,551 American-Egyptian bales for 1936; 17,619 for 1935; 14,052 for 1934; 9,683 for 1933; 8,365 for 1932; 13,668 for 1931; 23,312 for 1930; 28,771 for 1929; 28,313 for 1928; 24,223 for 1927; 16,232 for 1926; 20,053 for 1925; 4,319 for 1924; 22,426 for 1923; 32,824 for 1922; 37,094 for 1921; 92,561 for 1920; 40,437 for 1919; and 36,187 for 1918.

†Monthly reports collected from oil mills; total linter production not available until close of season.

[1] From "Cotton Production in the United States, Crop of 1936." Prepared by Harvey J. Zimmerman, chief statistician for cotton. United States Department of Commerce, Washington, D. C.



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Cotton and Fabrics

(*Continued from page* 90)

governmental control measures inaugurated in 1933, when several million acres were plowed under, the United States had been able to market 14,000,000 to 15,000,000 bales yearly with little difficulty, and for 10 years prior to 1933 the annual yield in the United States averaged 14,613,000 bales. In 1932 foreign grown cotton was reported at 10,625,000 bales, but since that time it has increased to an estimated 18,200,000 bales, high record for the season ending July 31, 1937. Figures now point to a world consumption of 13,100,000 bales of American cotton and a world consumption of all kinds of 30,900,000 bales. These figures show a big increase in world consumption of foreign grown cotton and a decrease in world consumption of American grown cotton.

Fabrics

The market has been very soft with comparatively little activity. It is expected that the market will be more settled when definite information is at hand regarding the season's production and governmental action.

Prices on tire fabrics declined ½¢ per pound. Hollands remained practically unchanged. Ducks declined approximately 1¢ per yard except tennis duck, which increased 2½¢ per yard. Osnaburgs dropped between ⅝¢ and 2¢ per yard; drills receded ½¢ to 1⅛¢, and sheetings ¼¢ to 1¢ per yard.

New York Quotations

New York outside market rubber quotations in cents per pound

Plantations	July 27, 1936	June 26, 1937	July 27, 1937
Rubber latex...*gal.*	61/62	72/73	67/68
Paras			
Upriver fine	19¼	20	19¾
Upriver fine	*24	*26	*25½
Upriver coarse	12½	13¼	12
Upriver coarse	*17½	*19	*18½
Islands fine	19¼	19	19
Islands fine	*24	*26	*25
Acre, Bolivian fine	19½	20½	20
Acre, Bolivian fine	*24	*26	*26
Beni, Bolivian fine	19½	21½	20½
Madeira fine	19½	20	19¾
Caucho			
Upper ball	12½	13¼	11
Upper ball	*17½	*19	*16
Lower ball	12½	13	10½
Pontianak			
Bandjermasin	6	7	8
Pressed block	10/20	10¼/31	11/31
Sarawak	6	7	8
Guayule			
Duro, washed and dried	13½	16	15
Ampar	14	16½	15½
Africans			
Rio Nuñez	14½	20	20½
Black Kassai	15½	19	19¾
Prime Niger flake	27	28	26½
Gutta Percha			
Gutta Siak	11	10½	10½
Gutta Soh	13½	16¾	19
Red Macassar	1.10	1.20/1.35	1.10/1.20
Balata			
Block, Ciudad Bolivar	30	30	31
Manaos block	26	28	28
Surinam sheets	31	38	38
Amber	36	40	41

*Washed and dried crepe. Shipments from **Brazil.**

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for June, 1937:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other forms of Latex Tons
United Kingdom	5,970	325
United States	25,917	488
Continent of Europe	12,696	479
British possessions	5,533	96
Japan	2,271	9
Other countries	1,023	2
Totals	53,410	1,399

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	8,373	4,139
Dutch Borneo	3,687	850
Java and other Dutch islands	967	13
Sarawak	1,899	..
British Borneo	185	20
Burma	251	8
Siam	1,967	736
French Indo-China	193	203
Other countries	112	11
Totals	17,634	5,980

New York Quotations

(*Continued from page* 88)

Softeners—(*Cont'd*)		
Plastogen *lb.*		
Plastone *lb.*	$0.30	/$0.35
Reogen *lb.*		
Rosin oil, compounded *gal.*	.40	
RPA No. 1 *lb.*		
No. 2 *lb.*		
Rubtack *lb.*	.10	
Tackol *lb.*	.115	
Powder *lb.*		
Tonox *lb.*	.16	
Witco No. 20 *gal.*	.18	
Softeners for Hard Rubber Compounding		
Resin C Pitch 55° C. M.P. *lb.*	.013 /	.014
Resin C Pitch 70° C. M.P. *lb.*	.013 /	.014
Resin C Pitch 85° C. M.P. *lb*	.013 /	.014
Solvents		
Beta-Trichlorethane *gal.*		
Bondogen *lb.*		
Carbon bisulphide *lb.*		
tetrachloride *lb.*		
Stabilizers for Cure		
Laurex, ton lots *lb.*		
Stearex B *lb.*	.108 /	.118
Beads *lb.*	.108 /	.118
Stearic acid, single pressed *lb.*	.11½	
Stearite 100 *lbs.*	10.50	/11.80
Zinc stearate *lb.*	.23	
Synthetic Rubber		
Neoprene Latex Type 50 *lb.*		
53 *lb.*		
54 *lb.*		
Type E. *lb.*		
"Thiokol" A (f.o.b. Yardville) *lb.*	.35	
Coating Materials *gal.*	2.50 /	5.00
DX *lb.*	.55	
Molding Powder *lb.*	.50 /	.75
Tackifier		
B. R. H. No. 2 *lb.*	.015 /	.016
Varnish		
Shoe *gal.*	1.45	
Vulcanizing Ingredients		
Sulphur		
Chloride, drums *lb.*	.03½/	.04
Rubber 100 *lb.*	2.00	
Telloy *lb.*		
Vandex *lb.*		
(See also Colors—Antimony)		
Waxes		
Carnauba, No. 3 chalky *lb.*	.35 /	.36½
2 N.C. *lb.*	.40 /	.41
3 N.C. *lb.*	.37½/	.38
1 Yellow *lb.*	.46½/	.47
2 *lb.*	.45½/	.46
Montan, crude *lb.*	.11 /	.11½

Impregnated Cord V-Belt

In the Vulco Rope V-Belt the tension member is made of cords which have been saturated with a liquid rubber compound; whereas the usual practice is to use unsaturated cords. It is claimed that the impregnation provides a bond between the cords and the surrounding rubber, overcoming the tendency of the cords to tear loose while the belt is being subjected to rapid bending and flexing. This feature is said to lengthen the life of the belt. The Gates Rubber Co.

Tire Production Statistics

Pneumatic Casings—All Types

	In-ventory	Production	Total Shipments
1934	9,454,985	47,232,748	46,686,545
1935	8,195,863	49,361,781	50,183,129
1936	11,114,399	58,116,349	55,362,739
1937			
Jan.	11,377,015	4,980,174	4,509,240
Feb.	12,307,681	5,245,894	4,370,630
Mar.	12,448,167	5,915,575	5,787,051
Apr.	12,628,872	5,729,869	5,560,453
May	12,592,215	5,351,638	5,374,654

Inner Tubes—All Types

1934	9,179,893	46,227,807	45,045,495
1935	8,231,351	47,879,034	48,066,904
1936	10,985,273	57,247,554	54,624,321
1937			
Jan.	11,100,094	4,801,186	4,390,960
Feb.	11,733,525	5,090,504	4,536,354
Mar.	11,904,354	5,822,646	5,570,705
Apr.	12,218,374	5,626,849	5,325,486
May	12,106,849	4,955,948	5,028,364

Industrial Pneumatic and Solid Truck, Tractor, and Trailer Tires

	In-ventory	Production	Total Shipments
1934	16,397	197,497	187,152
1935	20,315	283,606	275,741
1936	32,694	389,240	385,164
1937			
Jan.	47,020	37,979	40,421
Feb.	.....	42,716	40,924
Mar.	.....	49,138	47,210
Apr.	.....	49,549	46,856
May	.....	52,841	50,765

Solid and Cushions for Highway Transportation

	In-ventory	Production	Total Shipments
1934	13,574	*	*
1935	11,266	*	*
1936	8,908	*	*
1937			
Jan.	5,680	1,385	1,673
Feb.	....	1,507	1,472
Mar.	.....	1,544	1,812
Apr.	.....	1,560	1,981
May	.....	1,637	1,493

	Cotton and Rubber Consumption, Casings, Tubes. Solid and Cushion Tires		Consumption of Motor Gasoline (100%) Gallons
	Cotton Fabric Pounds	Crude Rubber Pounds	
1934	196,069,495	697,558,218	17,063,298,000
1935	202,318,119	756,773,779	18,167,352,000
1936	199,546,100	754,301,443	20,242,782,000
1937			
Jan.	17,987,663	66,728,092	1,415,232,000
Feb.	18,975,305	67,185,852	1,344,000,000
Mar.	21,499,363	77,363,656	1,703,562,000
Apr.	19,990,810	75,258,546	1,823,178,000
May	18,847,111	68,857,256	1,910,328,000

Rubber Manufacturers Association, Inc., figures have been adjusted to represent 100% of the industry based on reports received which represent 97% for 1934-1935 and 81% for 1936-1937.

**Figures for years 1934, 1935, and 1936 included under Industrial Pneumatic and Solid Truck, Tractor, and Trailer Tires.*

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

RUBBER TECHNOLOGIST: TEN YEARS' EXPERIENCE IN THE chemistry and technology of rubber, chiefly mechanicals, hard rubber, and dipped goods. Familiar with modern compounding and manufacturing practice. Would also consider position as superintendent of small plant. Address Box No. 844, care of INDIA RUBBER WORLD.

CHEMIST-COMPOUNDER, FOUR YEARS' EXPERIENCE IN heels, soles, and footwear. College man. Employed at present. Prefer to go south or west. Address Box No. 850, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

WANTED: EXPERIENCED RUBBER CHEMIST, ALSO CAPABLE of acting as assistant superintendent in mechanical rubber goods factory. Knowlege of constructions desired, as well as compounding, testing, etc. State fully education, experience qualifications, and salary to Box No. 845, care of INDIA RUBBER WORLD.

GRADUATE CHEMICAL ENGINEER WANTED WITH TWO OR three years' mechanical rubber experience. Give qualifications and experience in first letter. Address Box No. 848, care of INDIA RUBBER WORLD.

WE NEED A CHEMIST, TO TAKE CHARGE OF OUR LABORAtory, who is thoroughly familiar with the different processes, uses, and application of reclaimed rubber, and one who has had technical as well as practical experience in handling reclaims, particularly mechanical and tire stocks. Write stating experience and salary to Box No. 849, care of INDIA RUBBER WORLD.

We Have a Completely Equipped Plant for Manufacturing
RUBBER SPECIALTIES
Backed by years of experience.
Let us quote on your requirements without obligation, of course.
ADMIAR RUBBER CO.
273 Van Sinderen Ave., Brooklyn, N. Y.
Division of Ideal Novelty & Toy Co., Inc.
Long Island City, New York

TERKELSEN MACHINE COMPANY
Manufacturers of
SPIRAL WRAPPING MACHINES
for
COILS OF STEEL, WIRE AND HOSE
Write for Particulars
325 A Street Boston, Mass.

MOLDS
WE SPECIALIZE IN MOLDS FOR
Heels, Soles, Slabs, Mats, Tiling and Mechanical Goods
MANUFACTURED FROM SELECTED HIGH GRADE STEEL BY TRAINED CRAFTSMEN, INSURING ACCURACY AND FINISH TO YOUR SPECIFICATIONS. PROMPT SERVICE.
LEVI C. WADE CO.
79 BENNETT ST. LYNN, MASS.

SITUATIONS OPEN—Continued

RUBBER CHEMIST, WITH TWO TO FIVE YEARS' EXPERIENCE, preferably in manufacture of molded rubber products. State age, education, type of work done in detail, and remuneration expected in first letter. Address Box No. 853, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

OPPORTUNITY FOR EXPERIENCED RUBBER band, tubing, and specialty man to operate small growing Ohio plant, with orders and sponsorship. Investment optional. State qualifications fully. Address Box No. 847, care of INDIA RUBBER WORLD.

Precipitated Surinam Balata
For golf ball manufacturers. Approximately 99% deresinated. Dependable deliveries. You also avoid fire or explosion hazard. Purer and cheaper than you can make it. Sample and price on request.
HUNTINGDON MANUFACTURING CO.
MEADOWBROOK, PA.

EXECUTIVE AVAILABLE

Manufacturing and sales executive with extensive and successful experience in the development and production of various types of rubber goods, offers his services as a practical engineer to some rubber company which requires an executive capable of operating a modern plant and guiding its sales policy. Can eliminate red tape, prevent costly waste and increase efficiency.

Would require a five figure salary commensurate with the services he could render and will earn it—or else. Not interested in any connection unless the opportunity is great enough to interest both himself and the company in its possibilities.

Volume of present business, operated for 16 years, is too great for firm's equipment and capital. Have excellent sales contacts with large jobbers, department and chain stores, to whom he is now selling a very high grade line of molded rubber sporting goods.

Engineering training includes practical plant maintenance, designing of special machinery and moulds for the manufacturing of hard rubber products, druggists' sundries and mechanical molded products. Can furnish ample proof of ability and character. Excellent health, age 43 years.

Address Box No. 851, care of INDIA RUBBER WORLD.

(*Advertisements continued on page 95*)

Rims Approved by The Tire & Rim Association, Inc.

Rim Size	6 Mos., 1937 No.	%	6 Mos., 1936 No.	%
Drop Center Rims, 16" Diameter and Under				
16x4.00D	9,170	0.1	4,479	0.0
16x4.25D	239,856	1.9	132,928	1.2
16x4.50D	931	0.0	22,767	0.2
15x5.00F	.....	..	502	0.0
15x5.50F	144,213	1.1	83,348	0.8
16x3.50D	1,232,121	9.5	.....	..
16x4.00E	5,229,183	40.5	4,063,854	36.7
16x4.25E	672,691	5.2	265,192	2.4
16x4.50E	2,069,762	16.3	1,565,955	14.1
16x5.00F	608,133	4.7	468,860	4.2
16x5.50F	88,319	0.7	39,581	0.4
16x6.00F	12,732	0.1	6,138	0.1
Drop Center Rims, 17" Diameter and Over				
17x3.00D	5,785	0.0	75,838	0.7
17x3.25E	28,601	0.2	419,307	3.8
17x3.62F	32,748	0.3	1,700,488	15.4
17x4.00F	356	0.0	14,197	0.1
17x4.19F	959	0.0	3,338	0.0
17x5.00F	3,650	0.0	2,895	0.0
18x2.15B	8,282	0.1	16,180	0.1
18x3.00D	1,717	0.0	22	0.0
18x3.25E	8,204	0.1	4,511	0.0
18x3.62F	31,475	0.2	.....	..
18x4.00F	4,760	0.0	515	0.0
18x4.19F	20,118	0.2	14,124	0.1
19x2.15B	1,405	0.0	5,727	0.0
19x3.00D	2,703	0.0	6,437	0.1
19x3.25E	350	0.0	8,713	0.1
19x3.62F	3,383	0.0	.....	..
20x3.25E	5,208	0.0	10,518	0.1
21x3.25E	11,208	0.1	2,704	0.0
Flat Base Passenger Rims				
All Sizes	13,865	0.1	20,605	0.2
High Pressure Rims				
All Sizes	352	0.0	777	0.0
15" Truck Rims				
15x7	2,331	0.0	2,329	0.0
15x8	1,087	0.0	755	0.0
17" Truck Rims				
17x6	16,859	0.1	.....	..
18" Truck Rims				
18x5	.....	..	524	0.0
18x6	5,151	0.0	2,161	0.0
18x7	28,569	0.2	20,749	0.2
18x8	4,328	0.0	1,642	0.0
18x9/10	3,454	0.0	2,437	0.0
20" Truck Rims				
20x5	635,635	4.9	711,463	6.4
20x6	1,004,766	7.8	911,424	8.2
20x7	277,856	2.1	186,834	1.7
20x8	106,511	0.8	88,062	0.8
20x9/10	19,279	0.2	8,276	0.1
20x10.50	.....	..	688	0.0
20x11	1,532	0.0	880	0.0
22" Truck Rims				
22x7	61	0.0	177	0.0
22x8	12,874	0.1	7,804	0.1
22x9/10	3,003	0.0	4,580	0.0
24" Truck Rims				
24x6	1,815	0.0	1,146	0.0
24x7	4,608	0.0	6,405	0.1
24x8	9,611	0.1	12,125	0.1
24x9/10	9,204	0.1	6,653	0.1
24x11	1,919	0.0	1,692	0.0
Drop Center Tractor Rims				
24x6.00S	15,123	0.1	2,863	0.0
24x8.00T	42,555	0.3	30,252	0.3
28x6.00S	2,302	0.0	1,245	0.0
28x8.00T	41,721	0.3	19,054	0.2
32x6.00S	.....	..	1,052	0.0
32x8.00T	5,881	0.0	1,723	0.0
36x6.00S	39,427	0.3	39,126	0.4
36x8.00T	29,204	0.2	6,075	0.1
40x6.00S	11,860	0.1	3,166	0.0
42x8.00T	416	0.0	.....	..
44x8.00T	190	0.0	30	0.0
12x3.00D	3,158	0.0	.....	..
15x3.00D	53,831	0.4	.....	..
18x5.50F	4,914	0.0	.....	..
20x4.50E	7,764	0.1	.....	..
20x5.50F	2,419	0.0	.....	..
21x3.00D	881	0.0	.....	..
22x4.50E	1,336	0.0	.....	..
36x3.00D	934	0.0	.....	..
36x4.50E	568	0.0	.....	..
Cast Rims				
10x5.00F	2,023	0.0	885	0.0
10x6.00F	726	0.0	442	0.0
15x2.50	166	0.0	.....	..
24x15	279	0.0	302	0.0
Clinchers	1,838	0.0	1,081	0.0
Airplane	982	0.0	631	0.0
Totals	12,913,191	..	11,047,233	..

U. S. Crude and Waste Rubber Imports for 1937

	Plantations	Latex	Paras	Africans	Centrals	Manicoba and Guayule	Matto Grosso	Totals 1937	Totals 1936	Balata	Miscellaneous	Waste
Jan. ....tons	30,674	1,171	625	167	23	160	..	32,820	31,292	13	383	201
Feb.	40,326	2,100	717	15	2	129	..	43,289	35,219	37	1,300	217
Mar.	48,367	2,117	1,285	47	11	212	..	52,039	37,451	21	894	572
April	33,147	1,683	734	79	17	190	..	35,850	40,365	6	283	99
May	48,196	1,809	612	46	2	175	..	50,840	35,600	44	669	868
June	45,680	2,678	318	70	22	188	..	48,956	41,802	47	641	374
Total 6 mos., 1937 ....tons	246,390	11,558	4,291	424	77	1,054	..	263,794	.....	168	4,170	2,331
Total 6 mos., 1936 ....tons	210,242	7,596	2,664	631	159	437	..	.....	221,729	576	4,221	1,254

Compiled from The Rubber Manufacturers Association, Inc., statistics.

United States Latex Imports

Year	Pounds	Value
1934	29,276,134	$3,633,253
1935	30,358,748	3,782,222
1936	44,469,504	6,659,899
1937		
Jan.	2,995,027	535,546
Feb.	4,418,474	775,202
Mar.	4,962,915	968,053
Apr.	3,658,660	724,757
May	4,470,572	941,235

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.†	Australia	Belgium	Canada	Czechoslovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1934	439,100	213,300	9,600	9,100	28,400	11,000	50,400	59,300	21,400	69,900	47,300	60,500	964,500
1935	455,800	175,100	10,000	7,600	26,900	11,200	52,300	62,900	26,100	57,600	37,600	59,100	935,900
1936	475,361	62,676	14,423	9,627	27,867	8,772	56,777	71,793	16,534	61,701	30,967	64,647	831,684
1937													
Jan.	42,655	3,855	590	854	1,632	567	4,701	7,041	1,770	8,298	2,633	5,959	76,458
Feb.	44,398	6,081	331	1,363	1,271	837	5,276	7,911	1,502	6,605	3,048	5,069	77,389
Mar.	39,888	7,197	1,293	1,641	2,612	601	5,359	7,668	2,119	6,914	3,598	6,172	78,208
Apr.	42,066	9,871	1,058	1,069	1,343	1,445	5,302	8,664	1,669	5,808	1,532	5,448	79,212

†U.K. figures show gross imports, not net imports. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Total	Philippines and Oceania	Africa	South American	Mexican Guayule	Grand Total
1934	467,400	379,400	79,100	6,500	6,300	11,100	17,600	17,700	19,600	1,004,800	1,400	3,500	9,100	400	1,019,200
1935	417,000	282,900	54,300	9,100	4,900	8,900	19,300	28,300	28,700	853,400	1,500	5,000	12,200	500	872,600
1936	353,667	309,641	49,685	8,648	5,859	8,177	21,013	34,578	40,769	832,037	1,619*	6,122	14,632	1,228	855,638
1937															
Jan.	24,746	27,132	4,514	487	579	1,234	4,015	3,849	2,827	69,383	80	635	1,286	160	71,544
Feb.	24,138	26,770	5,603	1,033	843	780	2,015	3,554	3,077	67,823	180	537	1,789	206	70,535
Mar.	40,138	40,807	7,049	885	1,149	1,239	1,425	3,873	3,173	99,738	181	472	1,792	136	102,319
Apr.	41,696	33,136	3,419	627	559	783	2,960	1,899	2,095	87,174	200*	600*	1,546	190	89,710
May	33,929	38,562	4,612	450	562	778	742	2,238	2,888	84,761	200*	600*	1,057	200*	86,818

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Classified Advertisements

Continued

MACHINERY AND SUPPLIES WANTED

WANTED TO BUY: 60-INCH, OR LARGER, MILLS AND NO. 2 Banbury mixer. Address Box No. 843, care of INDIA RUBBER WORLD.

WANTED: A COMPLETE SET OF TIRE MOLDS—BEAD TO BEAD. Address Box No. 846, care of INDIA RUBBER WORLD.

WANTED: MIXING MILLS, 22- BY 60-INCH APPROX.; THREE- or four-bowl calenders, 55- to 70-inch approx.; refiner mills, 20- by 30-inch approx.; reclaim refiners, also Banbury or Werner Pfleiderer, any size. Address Box No. 852, care of INDIA RUBBER WORLD.

WANTED: FOR OUR EXPANSION PROGRAM, GOOD USED equipment including Experimental Machines, Large Size Mills and Calenders, Tubers, Hydraulic Presses and a Banbury Mixer, etc. Advise us of your offerings. Address Box No. 854, care of INDIA RUBBER WORLD.

FOSTER D. SNELL, INC.
Chemists—Engineers
Every form of Chemical Service
305 Washington Street Brooklyn, N. Y.
215 N. Calvert Street, Baltimore, Maryland

New and Used
RUBBER MACHINERY
M. NORTON & COMPANY
MEDFORD MASS.

Where Needs Are Filled
The Classified Ad. Columns of INDIA RUBBER WORLD bring prompt results at low cost.

BARBER *Genasco* (M.R.) Hydrocarbon
(SOLID OR GRANULATED)
A hard, stable compound—produced under the exacting supervision of an experienced and up-to-date laboratory. Aging tests have proved Genasco to be *always* of uniform quality. Shipped to all parts of the world in metal drums. Stocks carried at Maurer, N. J. and Madison, Ill.
THE BARBER COMPANY, INC.
New York Philadelphia Madison, Ill. Chicago

INTERNATIONAL PULP CO.
41 Park Row, NEW YORK, N. Y.
SOLE PRODUCERS
ASBESTINE
REG. U. S. PAT. OFF.

CORONA GOLF BALL WINDING MACHINES
Used everywhere by manufacturers. Rented on a monthly basis in U. S. Sold outright in foreign countries.
Illustrated circular on request.
Corona Manufacturing Company
Mount Airy, Philadelphia, Pa., U. S. A.

HYDRAULIC VALVES

Operating, Globe, Angle, or Check Valves—Hydraulic Presses, Accumulators, Pumps, etc.—For almost any size or pressure.
Dunning & Boschert Press Co., Inc.
336 W. WATER ST. SYRACUSE, N. Y.

MECHANICAL MOLDED RUBBER GOODS
We Solicit Your Inquiries
THE BARR RUBBER PRODUCTS COMPANY
SANDUSKY, OHIO

GUARANTEED REBUILT MACHINERY
IMMEDIATE DELIVERIES FROM STOCK
MILLS, CALENDERS, TUBERS, HYDRAULIC PRESSES, PUMPS, VULCANIZERS, TIRE MAKING EQUIPMENT, MOULDS, ETC.
UNITED RUBBER MACHINERY EXCHANGE
319-323 FRELINGHUYSEN AVE., Cable Address "Urme" NEWARK, N. J.

Having our own machine shops we are fully prepared to offer thoroughly rebuilt and guaranteed:—

ACCUMULATORS	MIXERS	PUMPS
CALENDERS	CHURNS	SPREADERS
CUTTING MACHINES	MOTORS	TUBERS
MILLS	PRESSES	VULCANIZERS

L. ALBERT & SON
Offices and Warehouses
336 Whitehead Road, TRENTON, N. J. Adams, Arch and Union Streets, AKRON, O.
European Office and Representative—Mr. Andre Berjonneau, #33 Blvd. des Batignolles, 33, Paris (VIII) France

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	April, 1937		Four Months Ended April, 1937	
UNMANUFACTURED—*Free*	Pounds	Value	Pounds	Value
Crude rubber	92,495,363	$17,859,223	368,971,321	$65,768,599
Liquid latex	3,877,960	769,311	16,254,376	3,048,112
Jelutong or pontianak	1,381,586	135,412	4,488,273	440,622
Balata	7,098	1,457	127,077	25,592
Gutta percha	159,433	35,641	816,102	152,624
Guayule	425,000	52,361	1,548,000	190,787
Siak	56,000	4,567	89,600	7,430
Scrap and reclaimed	1,587,160	38,318	4,085,841	120,735
Totals	99,989,600	$18,896,290	396,380,590	$69,754,501
Chicle, crude—*Free*	1,298,945	$385,201	5,141,126	$1,474,842
MANUFACTURED—*Dutiable*				
Rubber tires—*number*	2,623	$7,631	22,632	$49,081
Rubber boots, shoes, and overshoes—*pairs*	1,455	1,087	15,389	8,010
Rubber soled footwear with fabric uppers—*pairs*	108,315	33,090	352,882	95,884
Golf balls—*number*	106,740	13,095	172,260	22,855
Lawn tennis balls—*number*	55,036	5,299	215,376	18,036
Other rubber balls—*number*	714,954	19,263	3,033,806	93,515
Other rubber toys, except balls	68,865	8,783	326,519	46,528
Hard rubber combs—*number*	66,672	4,033	280,910	16,992
Other manufactures of hard rubber	.....	2,286	.....	13,539
Friction or insulating tape	28,800	1,581	59,100	3,132
Belts, hose, packing, and insulating material	.....	12,408	.....	61,439
Druggists' sundries of soft rubber	.....	9,740	.....	26,917
Inflatable swimming belts, floats, etc.—*number*	192,331	12,463	708,319	45,836
Other rubber and gutta percha manufactures—*lb.*	185,282	41,610	582,064	121,119
Totals	.....	$172,369	.....	$622,883

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	2,352,248	$415,484	7,981,858	$1,547,321
Balata	146,419	43,682	345,262	100,062
Gutta percha, rubber substitutes, and scrap	12,780	2,401	323,734	72,229
Rubber manufactures	.....	4,975	.....	8,608
Totals	.....	$466,542	.....	$1,728,220

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	2,552,841	$107,021	8,607,449	$373,813
Scrap	8,733,646	168,200	21,067,035	377,645
Cements—*gu.*	33,268	25,433	119,638	103,718
Rubberized automobile cloth, *sq. yd.*	56,945	25,427	209,754	93,583
Other rubberized piece goods and hospital sheeting—*sq. yd.*	196,706	86,345	651,208	275,338
Footwear				
Boots—*pairs*	12,625	28,397	41,737	92,968
Shoes—*pairs*	31,688	15,803	115,123	58,336
Canvas shoes with rubber soles—*pairs*	38,862	21,821	128,086	67,067
Soles—*doz. prs.*	2,161	5,080	14,549	26,209
Heels—*doz. prs.*	63,541	36,822	234,876	127,693
Soling and top lift heets	69,832	13,278	205,229	36,922
Gloves and mittens—*doz. prs.*	8,451	17,358	30,091	63,687
Water bottles and fountain syringes—*number*	21,751	8,034	75,110	26,621
Other druggists' sundries	.....	46,248	.....	188,195
Gum rubber clothing—*doz.*	27,114	45,392	110,812	194,951
Balloons—*gross*	44,823	32,699	139,441	106,750
Toys and balls	.....	15,746	.....	35,710
Bathing caps—*doz.*	7,855	10,919	24,707	41,257
Bands	28,429	10,542	99,267	38,179
Erasers	26,139	14,649	119,937	71,411
Hard rubber goods				
Electrical battery boxes	15,968	10,633	111,429	47,948
Other electrical—*lb.*	33,287	8,559	160,689	38,956
Combs, finished—*doz.*	19,030	8,434	40,109	23,831
Other hard rubber goods	.....	20,273	.....	85,709
Tires				
Truck and bus casings, *number*	16,203	315,324	59,353	1,155,225
Other automobile casings, *number*	75,219	862,761	282,383	2,998,929
Tubes, auto—*number*	61,369	87,775	220,162	329,699
Other casings and tubes, *number*	6,446	52,373	23,189	168,484
Solid tires for automobiles and motor trucks—*number*	370	9,299	1,369	37,373
Other solid tires	91,817	13,352	449,177	60,151
Tire sundries and repair materials	.....	79,520	.....	274,996
Rubber and friction tape	87,642	18,084	284,143	69,212
Fan belts for automobiles—*lb.*	71,982	35,101	229,196	125,068
Other rubber and balata belts—*lb.*	300,889	155,611	1,045,581	517,790
Garden hose—*lb.*	102,950	17,866	379,285	77,999
Other hose and tubing—*lb.*	473,611	181,360	1,785,267	663,408
Packing	158,746	64,061	604,225	266,342
Mats, matting, flooring, and tiling	98,648	12,623	393,378	60,412
Thread	109,956	36,236	344,064	150,914
Gutta percha manufactures	113,247	32,424	453,290	124,806
Other rubber manufactures	.....	99,256	.....	467,310
Totals	.....	$2,856,139	.....	$10,144,615

Rubber Goods Production Statistics

TIRES AND TUBES*		1937	1936
Pneumatic casings		Apr.	Apr.
Production	*thousands*	5,730	4,854
Shipments, total	*thousands*	5,560	4,903
Domestic	*thousands*	5,438	4,836
Stocks, end of month	*thousands*	12,629	9,034
Inner tubes			
Production	*thousands*	5,627	4,824
Shipments, total	*thousands*	5,325	4,746
Domestic	*thousands*	5,242	4,681
Stocks, end of month	*thousands*	12,218	8,788
Raw material consumed			
Fabrics	*thous. of lbs.*	24,680	20,458
MISCELLANEOUS PRODUCTS			
Single and double texture proofed fabrics			
Production	*thous of yds.*	4,626	3,869
Rubber and canvas footwear			
Production, total	*thous. of prs.*	7,197	5,876
Tennis	*thous. of prs.*	4,053	2,888
Waterproof	*thous. of prs.*	3,144	2,988
Shipments, total	*thous. of prs.*	5,027	4,970
Tennis	*thous. of prs.*	3,784	3,519
Waterproof	*thous. of prs.*	1,243	1,451
Shipments, domestic, total	*thous. of prs.*	5,027	4,928
Tennis	*thous. of prs.*	3,784	3,480
Waterproof	*thous. of prs.*	1,243	1,447
Stocks, total, end of month	*thous. of prs.*	19,167	16,699
Tennis	*thous. of prs.*	5,213	6,565
Waterproof	*thous. of prs.*	13,954	10,134

*Data for January to July, 1935, are estimated to represent approximately 97% of the industry; for August, September, October, November, and December, 1935, the coverage is estimated to be 81%.

Source: *Survey of Current Business,* Bureau of Foreign & Domestic Commerce, Washington, D. C.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	COMMODITY	CITY AND COUNTRY
†3,439	Rubber goods manufacturing machinery	Kaunas, Lithuania
*3,447	Combs	Bogota, Colombia
*3,459	Thread	Buenos Aires, Argentina
†3,563	Links cut from old tires	London, England
*3,571	Toy balloons	Lima, Peru
*3,574	Syringes	Manila, P. I.
*3,579	Heels, toys, and novelties	Port of Spain, Trinidad
*3,590	Rubber goods and bicycles	Karachi, India
*3,619	Crude rubber	Buenos Aires, Argentina
*3,622	Carbon black	London, England
*3,626	Tires	Havre, France

*Agency. †Purchase.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	INQUIRY
2329	Supplier of Falsol.
2330	Manufacturer of rubber cement churns.
2331	Manufacturer of collapsible bathtubs.
2332	Manufacturer of a tubing machine having two screws in one single head.
2333	Manufacturer of rubber molds for plaster of Paris reproductions.
2334	Manufacturer of a rubber thread cutter.
2335	Manufacturer of a folded rubber drinking cup.
2336	Manufacturer of waterproof clothing.
2337	Manufacturer of hospital sheeting.
2338	Manufacturer of rubber dishes.
2339	Manufacturer of "a garter of solid rubber (not webbing) about 15 inches long, one inch wide, 1/8-inch thick, beaded edge, with four holes at one end and a rubber button at the other end."
2340	Supplier of wood flour.
2341	Supplier of leather fiber.
2342	Supplier of cork dust.

Imports by Customs Districts

	May, 1937		May, 1936	
	*Crude Rubber		*Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	11,684,221	$2,532,207	6,241,055	$936,312
Buffalo	.....	.....	110	17
New York	82,979,027	17,461,616	58,258,266	8,557,332
Philadelphia	1,410,668	258,445	2,845,334	430,840
Maryland	1,437,746	303,658	892,836	121,851
Mobile	.....	.....	347,356	51,146
New Orleans	386,529	79,342	976,675	144,394
Los Angeles	11,460,820	2,402,793	12,883,975	1,629,199
San Francisco	454,215	92,425	627,861	82,395
Oregon	22,400	4,480	22,400	3,360
Michigan	2,309	552	.....	.....
Ohio	99,180	19,250	93,901	10,778
Totals	109,937,115	$23,154,768	83,189,769	$11,967,624

*Crude rubber including latex dry rubber content.

SIGN OF THE TIMES

Scene in Our Plant, THE PIONEER ASPHALT COMPA

Everywhere there are signs that point to business on a bigger scale. Producers and distributors are confidently going ahead with plans for expansion. Activity is in the air. Are you equipped with a reliable, cooperative source of supply for chemicals, oils and pigments?

Witco is prepared to meet your requirements with a comprehensive variety of products and experienced technical counsel in all matters pertaining to their use. We invite your investigation of the following:

WITCO CARBON BLACKS are produced to rubber manufacturers' individual requirements. A black for every purpose, each with a proven record of quality results.

WITCO BARYTES easily pass the most critical inspection for high barium sulphate content, fineness of grinding, texture and color quality.

WITCO WHITING is known for its excellent tear resistance, a vitally important property in such articles as inner tubes, bath caps, hot water bottles and rubber sheeting.

WITCO CADMIUM REDS give excellent results in products where bright color, fastness to light, alkalies, and resistance to acids and heat are required. Five grades: Light, Medium Light, Medium, Deep and Maroon.

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The Pioneer Asphalt Company
Panhandle Carbon Company

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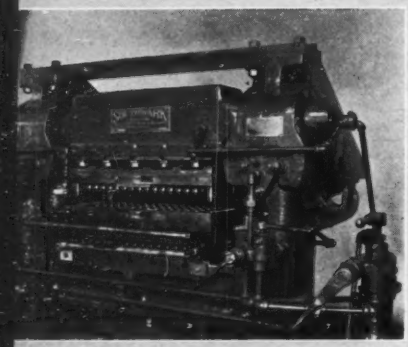

An Improved

TILTING HEAD MOLDING PRESS

FEATURES

Adjustable stroke hydraulic push-pull ejector. Ejection at any point of platen stroke or head position. No cramping or binding of ejecting pins. Reseating is positive. Either top or bottom ejectors, or both, can be furnished. Substantial base. Side frames have stops to prevent over-stroking main rams. Complete specifications on request.

Developed to provide rigid, compact, highly productive presses with large platen areas and of any required press tonnage, this improved Baldwin-Southwark-Burroughs Tilting Head Molding Press marks a decided step forward in the art of molding thermo-plastic materials. The head is balanced, hydraulically actuated backward and forward in a horizontal plane, and rotated through an arc of 90°. Controls are simple, positive, adjustable. Head construction is rugged, doing away with deflection and insuring correctly pressed pieces, without excessive flash, from center cavities even when large molds are used. Many features of design and operating advantages of this new press should interest you . . . let us tell you about them.

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Southwark Division, Philadelphia

Pacific Coast Representative: THE PELTON WATER WHEEL CO., San Francisco

SOUTHWARK PRESSES

LAUREX

is the ideal plasticizer of rubber at milling, calendering and tubing temperatures. It reduces factory costs because of lower power required and greater output per hour.

QUALITY is improved due to better dispersion of pigments, less mastication of the rubber and proper activation of cure. **LAUREX** is the ideal activator of vulcanization and assists in producing a good, firm, tightly cured rubber that resists wear and tear. There is a minimum of bloom or greasy appearance.

LAUREX is in a pulverized form easily handled in the compound room and disperses easily and quickly in rubber.

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DIVISION OF UNITED STATES RUBBER PRODUCTS, INC.

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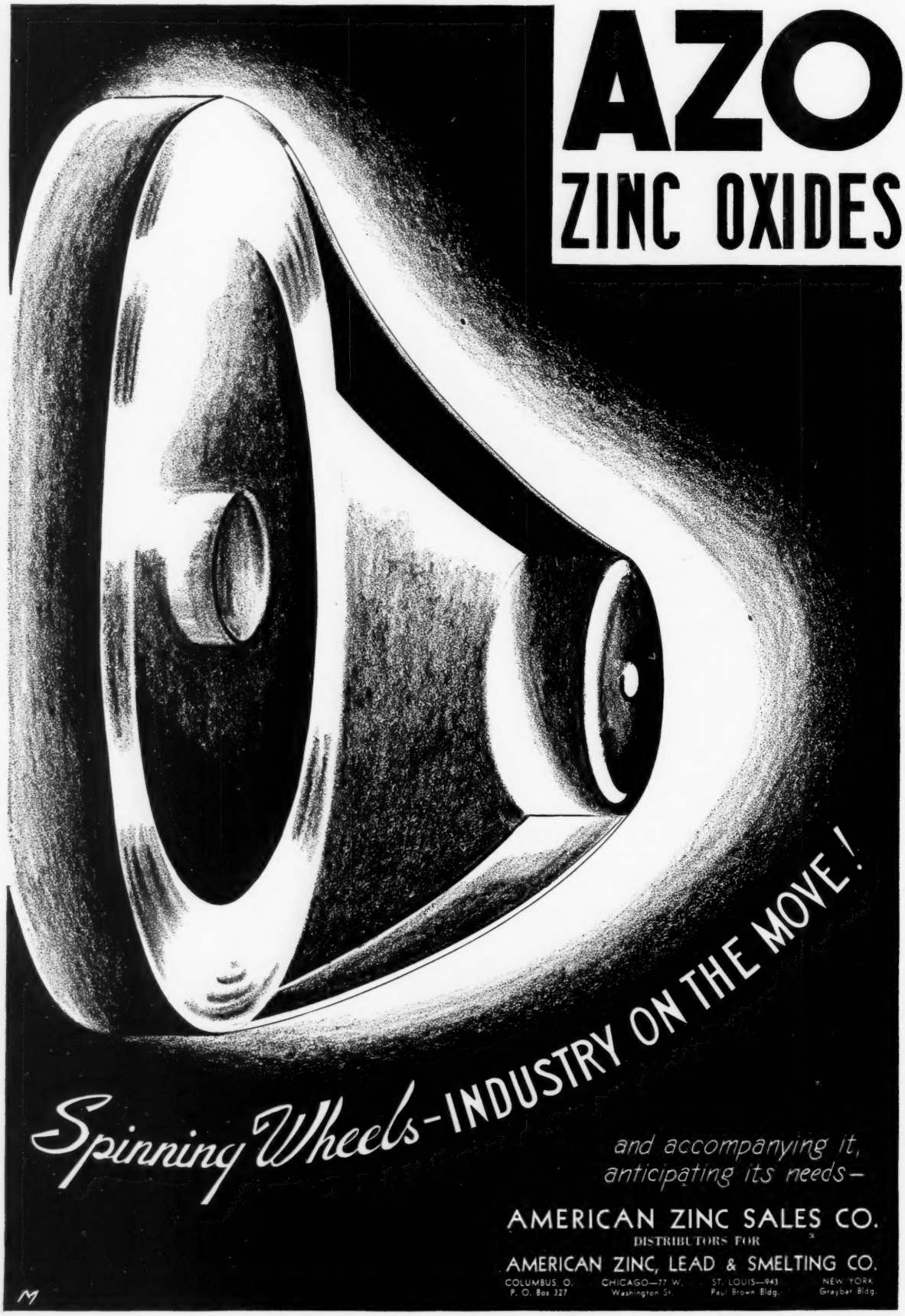
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and accompanying it,
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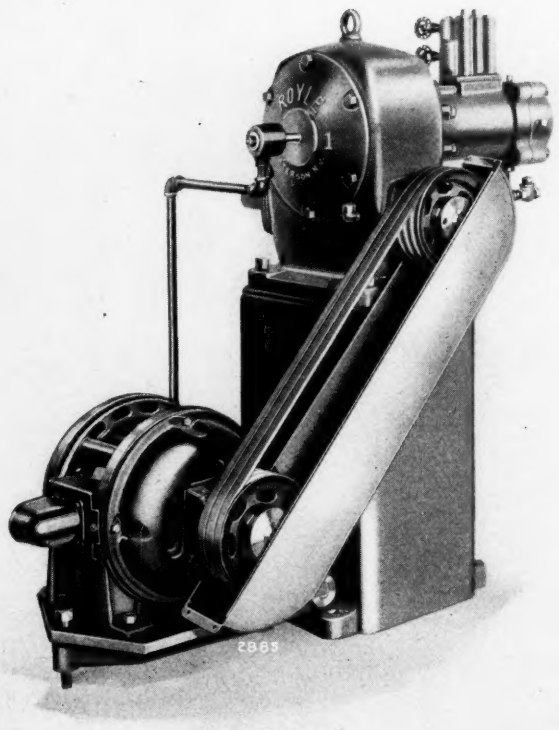
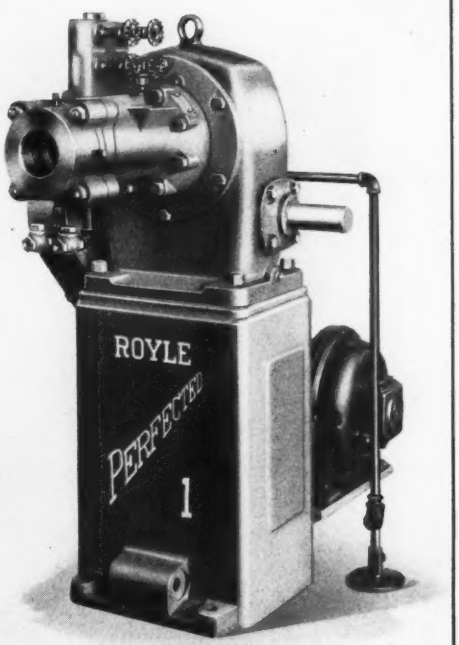
NEWS



No. 1 extruder, rear view, belt-drive cover removed.



No. 1 extruder, shown with standard tubing head.

ROYLE
PATERSON
N J

SPECIFICATIONS:

ROYLE PERFECTED TUBING MACHINE NO. 1

Normal die range for tubing, ¼ to 1 inch; Maximum die 1¾ inch.
Wire covering, up to No. 14 Amer. Wire Gauge.
Stock screw, 2-inches diam., water cooled.
Gear reduction, 15-1 or other.
Usual motor, 5 h.p., 1200 r.p.m.
Motor base adjustable, reversible.
Floor space, 25 x 45 inches.
Height, floor to feed throat, 40 inches.

Here is the tubing machine for big production of small items at low cost. Every rubber manufacturer needs this convenient size extruder for work in the class of druggists' and stationers' sundries, weather strip, pen barrels, bead wire coating, electric wire insulation and the like. The new Perfected No. 1 is compact, modern —a completely redesigned version of the Royle 2-inch tubing machine. Positive temperature control. Automatic lubrication. Smooth, vibrationless V-belt drive through quiet, long-lived worm-and-gear reducer. Roller bearing equipped. Famous Royle standards are maintained in every particular. Investigate today.

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"Raymix"—A distinctly new type of rayon flocking fibres producing both suede and pile surfaces.

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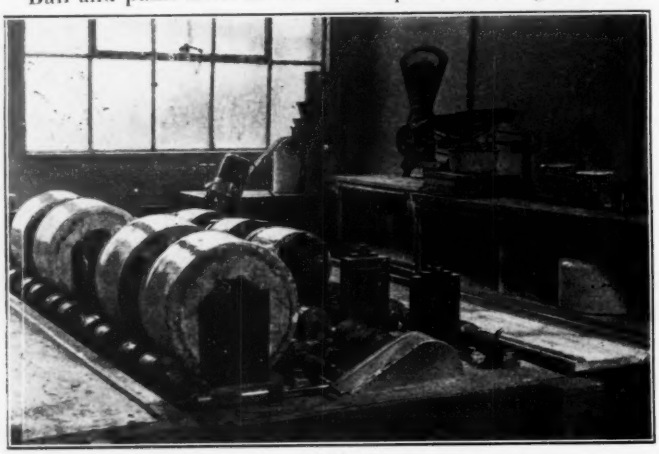
LATEX COMPOUNDING

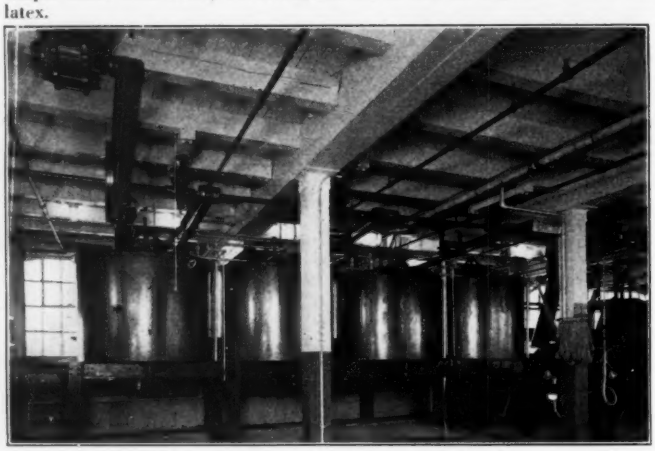
REQUIRES

Ball and paint mills to wet and disperse solid ingredients,



AND

simple tanks with slowly revolving stirrers to mix all ingredients into the latex.



A Portion of the Latex Compounding Room at the Dewey and Almy Chemical Co., Cambridge, Mass.

SAVES

EQUIPMENT

LABOR

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ELIMINATES

Heavy costly

BREAK DOWN MILLS

MIXING MILLS

CALENDERS

AND

EXTRUDERS

necessary in the preparatory operations of conventional rubber practice.

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Besides control of patents governing the practice of the KAYSAM principle this company possesses licensing rights to a number of other important patents covering the *manipulation of latex itself.*

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KAYSAM CORPORATION OF AMERICA

Representatives' Office

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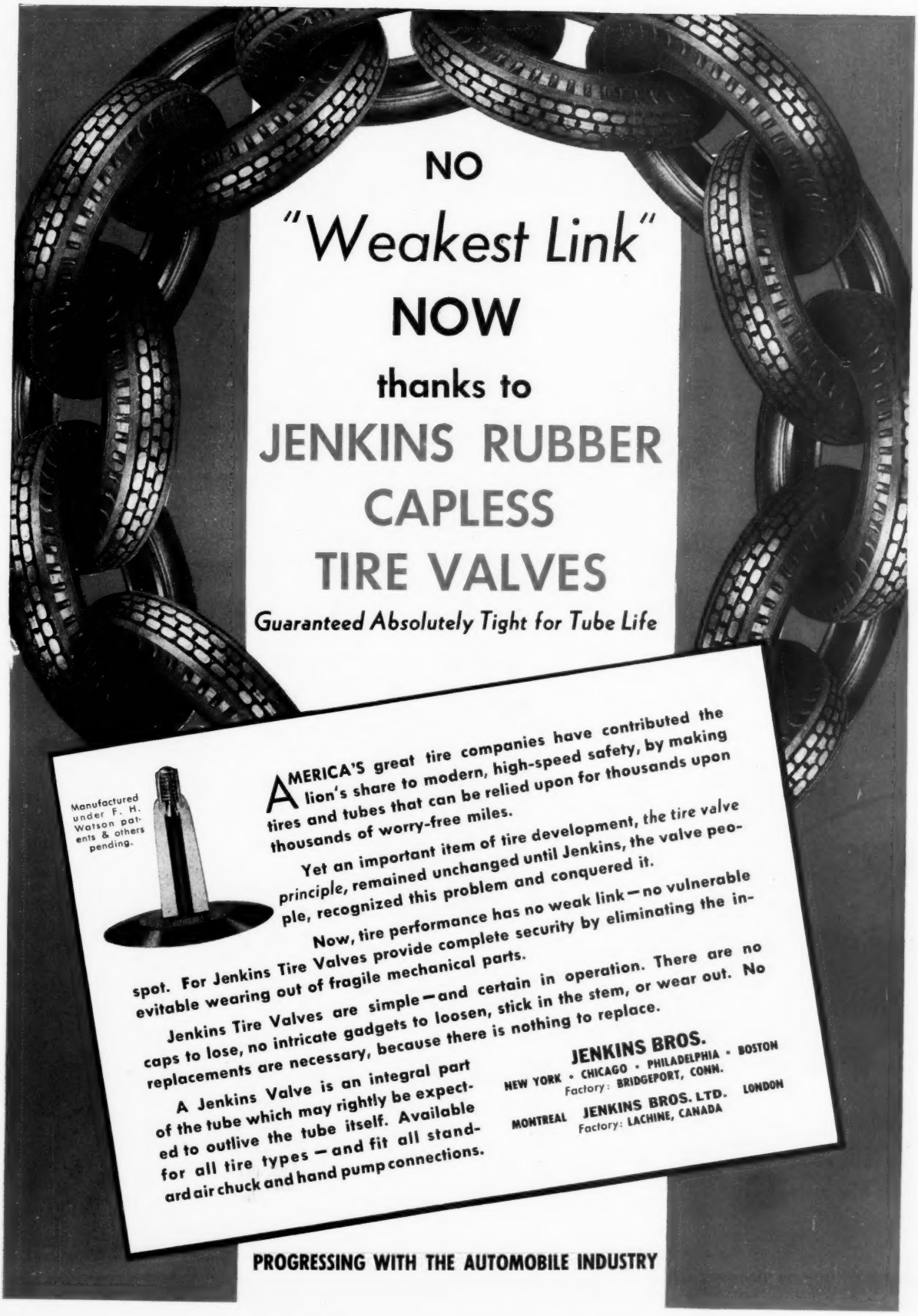
Inquiries from countries outside of United States (including Possessions) Canada and Australia should be addressed to Kaysam Syndicate, Ltd., 7 Gracechurch Street, London E.C.3, England.



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JENKINS RUBBER CAPLESS TIRE VALVES

Guaranteed Absolutely Tight for Tube Life

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AMERICA'S great tire companies have contributed the lion's share to modern, high-speed safety, by making tires and tubes that can be relied upon for thousands upon thousands of worry-free miles.

Yet an important item of tire development, *the tire valve principle*, remained unchanged until Jenkins, the valve people, recognized this problem and conquered it.

Now, tire performance has no weak link—no vulnerable spot. For Jenkins Tire Valves provide complete security by eliminating the inevitable wearing out of fragile mechanical parts.

Jenkins Tire Valves are simple—and certain in operation. There are no caps to lose, no intricate gadgets to loosen, stick in the stem, or wear out. No replacements are necessary, because there is nothing to replace.

A Jenkins Valve is an integral part of the tube which may rightly be expected to outlive the tube itself. Available for all tire types—and fit all standard air chuck and hand pump connections.

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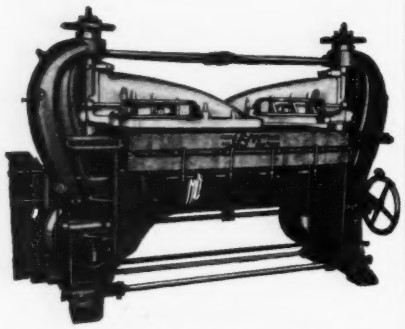
PROGRESSING WITH THE AUTOMOBILE INDUSTRY

MACHINES FOR THE MANUFACTURER AND MISCELLANEOUS

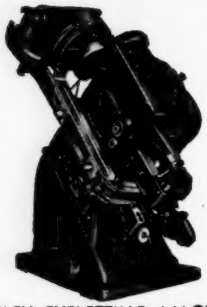


IDEAL TWIN CLICKING MACHINE—MODEL G

The Ideal Clicking Machines—Models C and G are available for cutting with dies, all materials used in making vulcanized footwear, and for other rubber products such as rubber soles, heels, tire patches, mechanicals and various sundries.

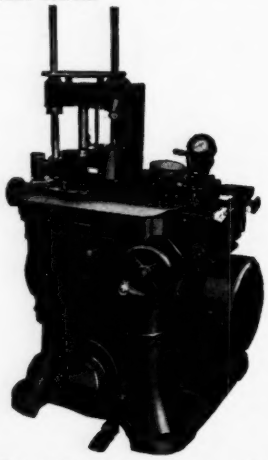
USMC LASTING MACHINE—MODEL RA

A semi-automatic machine for completely lasting all types of canvas vulcanized footwear. Individual motor drive, portable base, floor type machine.



DUPLEX EYELETTING MACHINE—MODEL B

A self-feeding machine for inserting eyelets in shoes, leggings, etc.; comprising two opposite sets of mechanism, inserting two eyelets directly opposite each other at each revolution of the machine. The spacing can be varied between eyelets.

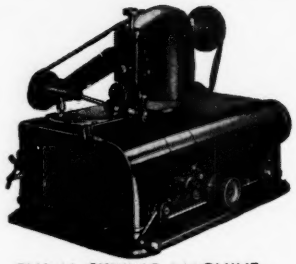


USMC OUTSOLING MACHINE—Model B

For applying outsoles to vulcanized footwear of all kinds, including rubber boots, lumberman's pacs and miners'. Individual motor drive, portable base, floor type machine.

USMC LINING TRIMMING MACHINE—MODEL B

Especially designed for trimming the surplus lining of rubber boots, pacs, lumbermen's boots, gaiters, and all types of rubber shoes.



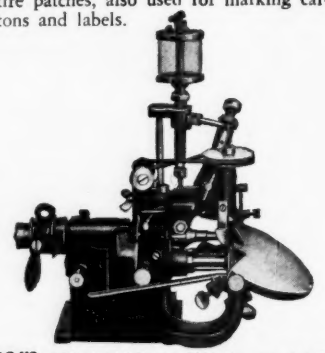
PLUMA SKIVING MACHINE—MODEL L

Particularly adapted for skiving belting, mats and all kinds of rubber material used in the manufacture and reclaiming of auto tires.

May be used to advantage in Rubber Shoe Factories for skiving counters, and rubber soles and heels where a roll edge is desired.

USMC MARKING MACHINE—Model A

For marking with ink, the style, size or lot numbers on all classes of rubber goods including shoes, belting and tire patches, also used for marking cartons and labels.

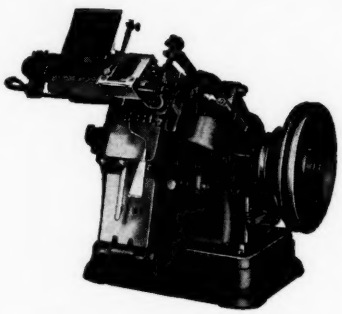


USMC TRIMMING MACHINE—Model C

For trimming the overflow on all types of moulded rubber heels, soles, taps and miscellaneous moulded rubber goods of similar construction.

May be fitted to trim successfully various types of circular moulded goods.

OF CANVAS AND RUBBER FOOTWEAR RUBBER GOODS



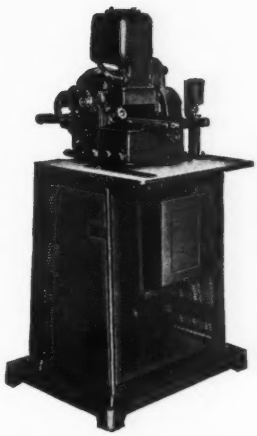
ENSIGN LACING MACHINE—MODEL B

For lacing one to six eyelets of a shoe upper to hold it in position during subsequent operations.

USMC TOP CEMENTING MACHINE—MODEL RB

This machine has displaced the slow, untidy, and wasteful hand method of cementing the marginal edge of canvas tops, gaiter, gum and boot linings, automatic fastener slides and other miscellaneous parts used in the manufacture of waterproof footwear.

May be fitted for either single or double cementing.



DOUBLE CEMENTING MACHINE—MODEL B

For cementing simultaneously both sides of rag fillers, juniors, stiffeners, etc. Capacity of 12,000 to 15,000 pairs daily. May also be fitted to cement straight edge outsoles.

APPRECIATING fully the importance of efficient machinery for use in manufacturing canvas and rubber shoes, the United Shoe Machinery Corporation provides many machines for this branch of the footwear industry.

The same high type of service rendered to makers of leather shoes is also maintained in connection with the operation of our machines in the canvas and rubber shoe division.

Complete information will be furnished upon inquiry at our Boston Office, or any of the branch offices listed below.

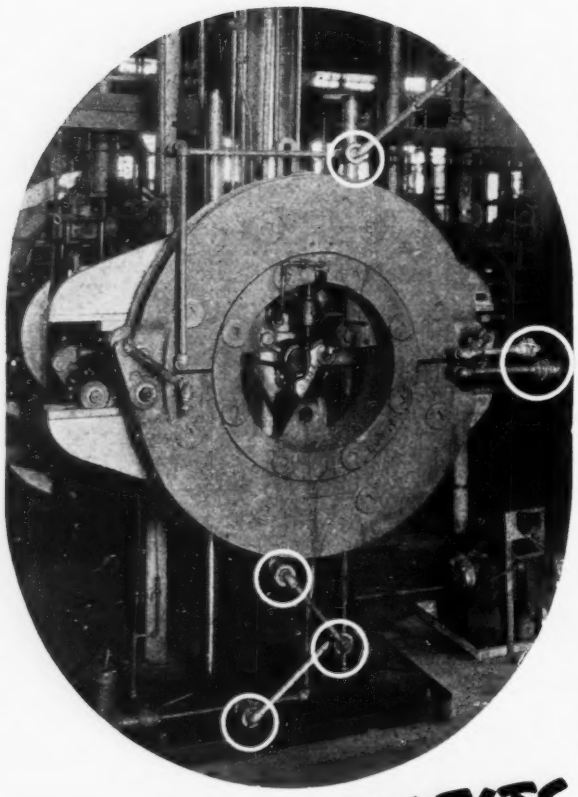
ROTARY CEMENTING MACHINE—MODEL RB

A floor type, motor driven machine, especially adapted for cementing insoles. Capacity of 15,000 to 20,000 pairs of insoles daily.

UNITED SHOE MACHINERY CORPORATION

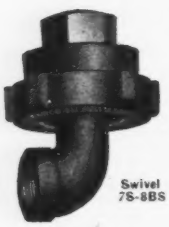
140 FEDERAL STREET, BOSTON, MASS.

Atlanta, Ga.....29½ Pryor, N. E.
Auburn, Maine.....108 Court
Brockton, Mass.....93 Centre
Chicago, Ill.....500 South Franklin
Cincinnati, Ohio.....407 East Eighth
Haverhill, Mass.....145 Essex
Johnson City, N. Y...19 Jennison Ave.
Lynn, Mass.....525 Union
Milwaukee, Wis.....922 North Fourth
New York, N. Y....110 Fifth Avenue
Philadelphia, Pa.....221 North 13th
Rochester, N. Y.....130 Mill
St. Louis, Mo.....1423 Olive
San Francisco, Calif.....859 Mission
Worcester, Mass.....71 Mechanic



PROTECT PROFITS

WITH BARCO JOINTS



● Operating at about 100 pounds steam pressure, and opening with a very wide spread, the tube mold illustrated above provides a severe test for all flexible connections. It is significant that BARCO joints are practically universal on this type of mold. They provide the flexibility which permits maximum production speed without danger of joint failures and costly shut-downs . . . contributing definitely to steady output and manufacturing profits.

Catalog No. 256 gives full details.

BARCO

SWIVEL JOINTS

BARCO MANUFACTURING CO.

1817 W. Winnemac Ave., Chicago, Illinois

12,000,000 POUNDS

MORE GASTEX PER YEAR

This will be of special interest to rubber manufacturers for the supply of GASTEX has recently been inadequate to cover the trade's requirements.

BUT NOW—four new units are under construction at Guymon, Oklahoma, with a capacity of 12,000,000 pounds yearly of GASTEX and PELLETEX (the black in pellet form). This plant will be in operation early in 1938 and will be modern in every respect. Most of the plant equipment will be constructed of a special alloy metal (non-corrosive) to insure a finished product of exceptional purity and uniformity. The new units will be located on the main line of the Rock Island Railroad and gas will be purchased from the Cabot Carbon Company whose large holdings insure an unlimited supply of fuel. Facilities will be provided for shipping PELLETEX in tank cars as well as in paper bags.

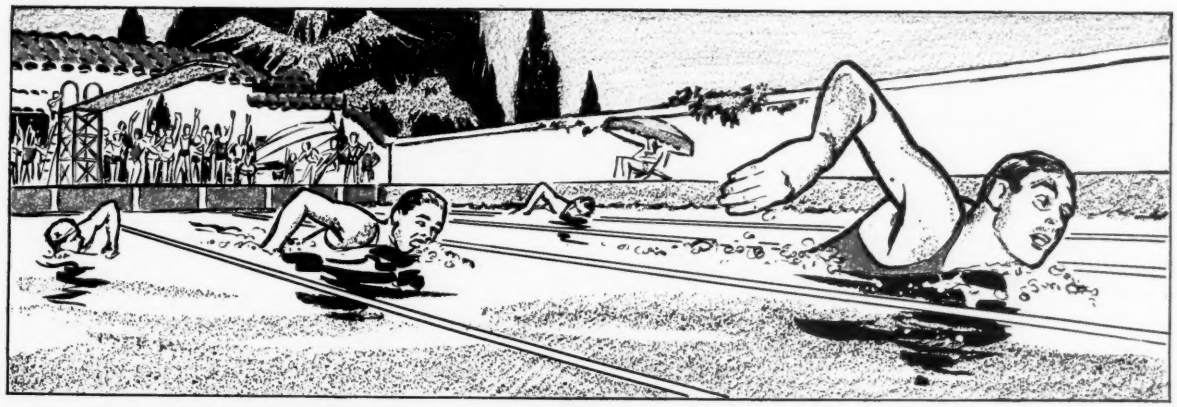
General Atlas Carbon Company expresses its sincere thanks to the many friends and users of GASTEX for their patience and support during the time when the supply of GASTEX has been inadequate to meet their requirements. Future requirements can be taken care of by expanding either or both of our plants.

GENERAL ATLAS CARBON COMPANY

SIXTY WALL STREET — GASTEX — NEW YORK, N. Y.

Sales Representatives: HERRON & MEYER, INC.

NEW YORK AKRON CHICAGO



ANOTHER Winner....

"SANTOFLEX-B"

R.S.L.'s NEW ANTIOXIDANT

Other products for the rubber industry include:

PERFLECTOL
UREKA C
UREKA BLEND B
GUANTAL
OXYNONE
EL-SIXTY
D P G
A-32

RSL HAS JUST RAISED ANTIOXIDANT PERFORMANCE TO A NEW ALL-TIME HIGH WITH SANTOFLEX - B

NO MATTER WHAT YOU HAVE BEEN USED TO . . . TEST IT . . . AND YOU'LL ADOPT IT.

Samples ready now!

CHEMICALS OF QUALITY Monsanto ST. LOUIS, U.S.A.

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RUBBER SERVICE LABORATORIES DIVISION
1012 Second National Building
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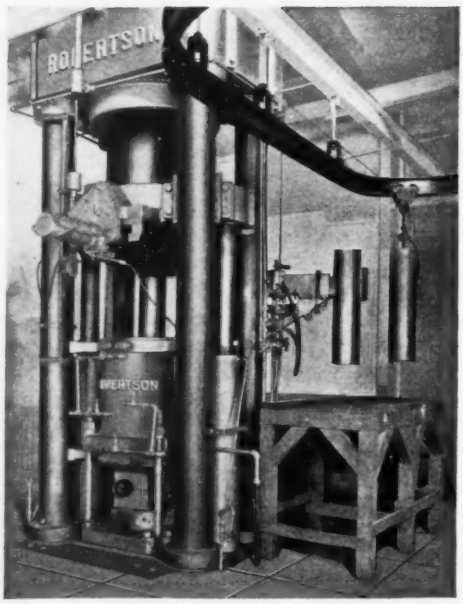
BOSTON *Grit* — A TRIBUTE TO ROBERTSON *Uniformity*



AT BOSTON WOVEN HOSE & RUBBER CO.

For famous Boston Woven Hose & Rubber Company we've designed and built a number of 2,100-ton Lead Hose Encasing Presses, complete with Slug Apparatus and allied equipment.

There *is* a prime reason why we were chosen. For, to maintain their high position in the industry, Boston must be assured a uniform, steady output of quality lead sheath. And, Robertson Presses do this consistently and uniformly—with minimum production and maintenance costs.

Leaders choose Robertson—*WISELY!*

Literature on request.

John ROBERTSON CO. INC. *Pioneers-Since 1858*

131 Water Street Brooklyn, N. Y.

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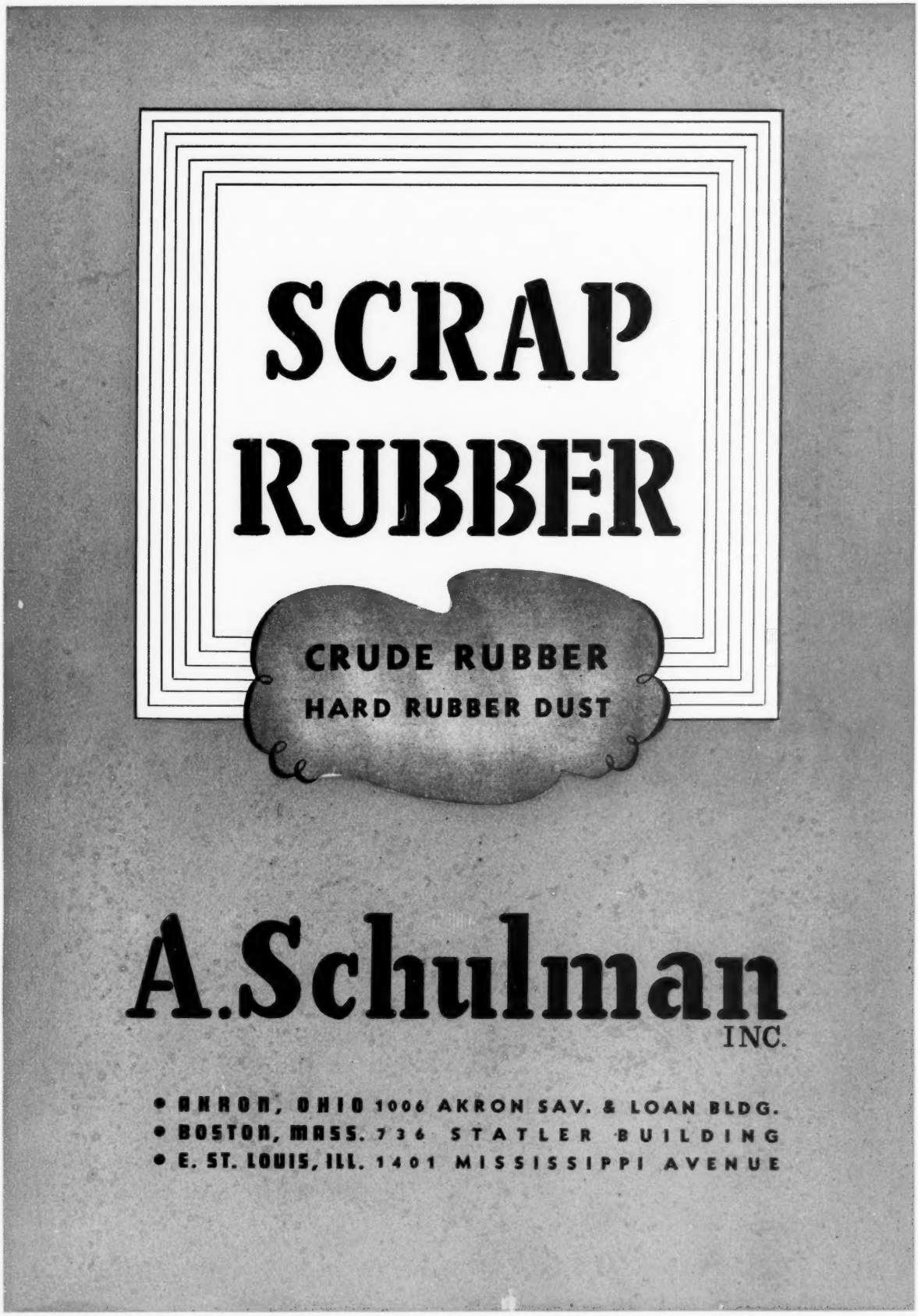
(Reenforcing Calcium Carbonate)

Gives that desired processability to light mechanical goods, while improving tensile, tear and resistance to abrasion.

The Columbia Alkali Corporation

Barberton, Ohio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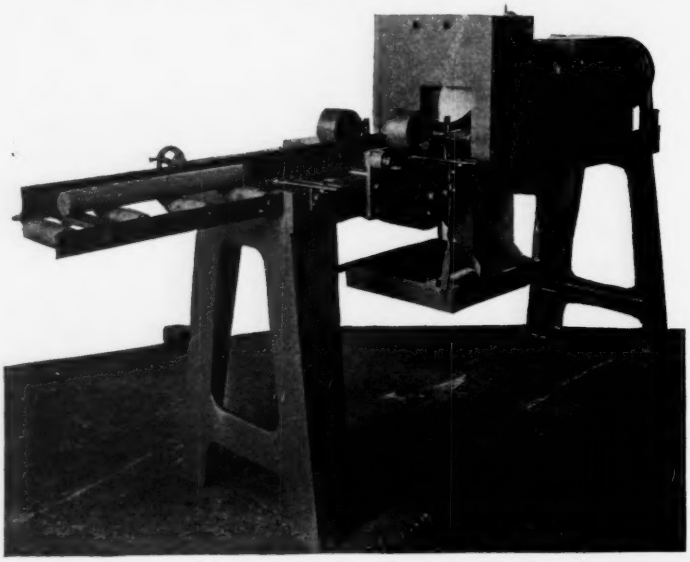

With High Speed Disc Cutting Blade, Automatic Feed and with Tandem Feed Wheels. Capacity Section Up to 3" by 4½"—Length ⅛" to 6".

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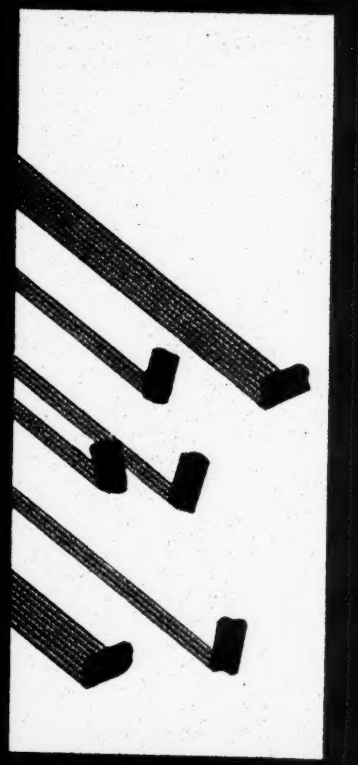
When Buying Whiting Do Not Fail To Specify

SOUTHWARK BRAND

Guaranteed Not to Contain Adulterations
Quality and Service Unexcelled

ESTABLISHED 1880

SOUTHWARK MFG. CO. *Factory and Home Office:* **CAMDEN, N. J.**



STILL LESS DUST

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MOBILE 66

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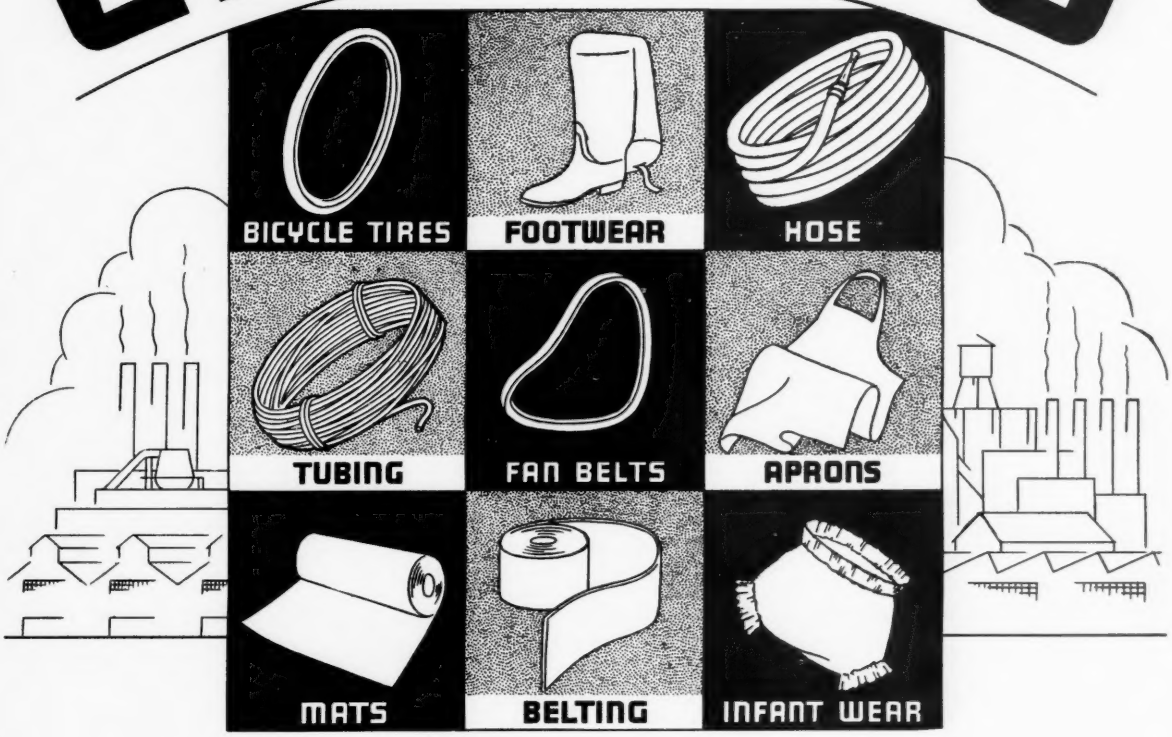

Unique for compounding

RUBBER MECHANICAL GOODS

Make Us Prove This:

- CATALPO will definitely improve the finish of your goods.
- CATALPO will give added snap and brilliance to colors used.
- CATALPO will improve aging—show better abrasion tests.
- CATALPO will aid processing, and *LOWER* production costs.

CATALPO is manufactured and sold exclusively by Moore & Munger. Our Technical Service Dept. at 33 Rector St., New York City, is ready to furnish details promptly.

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In other words don't take chances you can easily avoid. Use LATEX and there will be. . . .

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SAVE MONEY

. . . on solvents (all that evaporates is water) . . . on heavy milling machinery . . . on labor . . . on power . . . and . . .

GAIN

. . . safety of operation . . . employee ease of mind . . . better aging . . . greater tensile strength . . . better quality . . . at less cost.

Revertex Compounding Paste 225 Use: Single-sided rubberizing

DESCRIPTION: When mixed with Revertex makes a spread which after drying over steam coils becomes absolutely non-tacky and water-repellent. Contains an ultra-accelerator which eliminates the sulfur chloride cure and the starchbox.

RECOMMENDED for non-fraying coatings and inexpensive waterproof linings. Available in neutral and black. Other colors made up to order.

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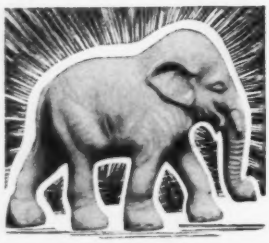

Makes a 10c Rubber Elephant Look Like a Rajah's Favorite

FORMULA F77 is a new process . . . for dressing and preserving mechanical rubber goods.

The display value and salability of toys, gloves, water bottles and other moulded rubber goods are considerably increased when this fine-particle, wax emulsion is used. Formula F-77 leaves a thin, lustrous film that overcomes tackiness, prevents oxidation, and resists dirt, dust and water. Easy to apply. Dries quickly. Economical. In two forms: Clear, which emphasizes whiteness and brightens colors; and a rich black which covers all blemishes. Order a sample can direct from

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HAVE YOU *A Hydraulic Press* PROBLEM TO LICK?

WHEN you have a tough hydraulic job to lick...you can trust it to Erie's 35 years of experience and skill in designing and building special hydraulic presses for the difficult production of the Rubber Industry.

Note how clear is the reflection on this photo.

Here's a *real* mirror finish on the inverted top platen of a special hydraulic job 18 foot length, 52 inch width.

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Direct your

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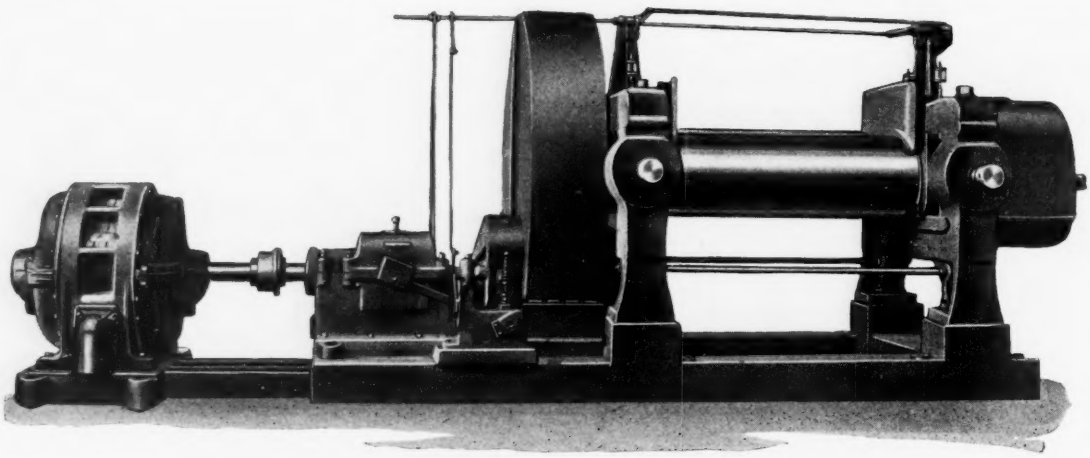

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HEAVY DUTY 14" DIAMETER NECK MILL
CONSTRUCTED TO STAND HARD, CONTINUOUS SERVICE

Write for Folder on Details of Operation and Prices

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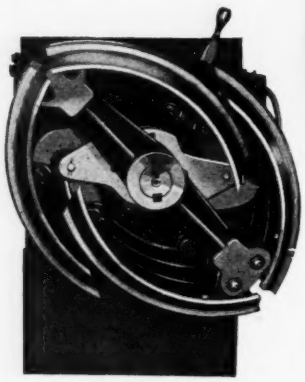
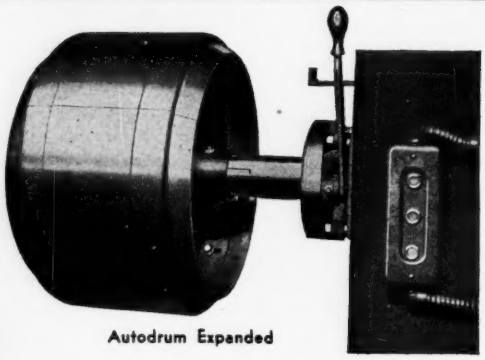
Numerous Refinements Gained by 49 Years' Experience in Manufacturing Rubber and Plastic Equipment

ARE YOU ADEQUATELY EQUIPPED TO MANUFACTURE ALL SIZE TIRES FROM 10" to 40" INCLUSIVE?



Autodrum Collapsed

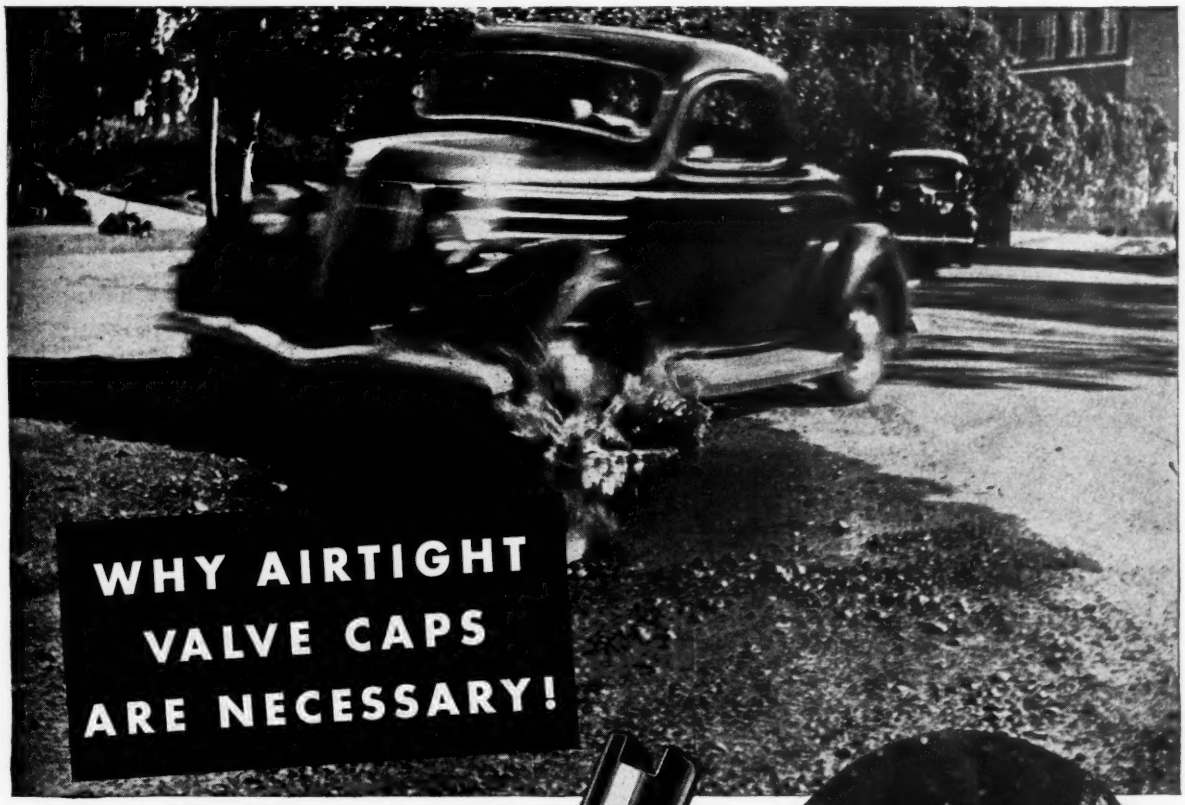


Autodrum Expanded

As usual our AUTODRUMS have made good on all these sizes and for Truck Tires, Tractor Tires and Airplane Tires, too!! They are the most economical, efficient drums on the market today.

Check up now, and if you are not adequately equipped with these size AUTO-DRUMS, mail your order at once.

The Akron Standard Mold Co.
Akron "The Established Measure of Value" **Ohio**



WHY AIRTIGHT VALVE CAPS ARE NECESSARY!

Under average service conditions, dirt—enough to cause leakage—can enter a tire valve through even the slightest opening.

Airtight valve caps seal the valve mechanism within the housing and completely exclude dust and dirt. Even a damaged valve mechanism is relatively unimportant if the housing is sealed by a Schrader Valve Cap! The cap will carry on until the valve mechanism can conveniently be replaced.

Replaceability and world-wide distribution make safe, doubly-sealed Schrader-type Tire Valves the most practical and economical.

Guaranteed airtight up to 250 lbs. pressure.

Dirt and dust cannot enter doubly-sealed Schrader Tire Valves.

COMPLETE PROTECTION

Right: Replaceable in only a few seconds—for genuine economy.

Left: Completely sealed for utmost safety.

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Division of Scovill Manufacturing Company, Inc.

Schrader

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Makers of Pneumatic Valves Since 1844

Progress

Every day new uses are being found for Vulcanized Latex. The experiment of today is the commonplace of tomorrow. Many rubber manufacturers have adopted some of the new ways of making their products by the use of Vultex and if you would know how it can be used in your plant to greater advantage, ask our technical department how we have adapted Vultex in products similar to yours. No obligation, of course.

●

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666 Main Street **Cambridge, Mass.**

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Canadian customers please address their inquiries to St. Remi, Napierville County, Quebec

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Established 1874

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Fine Rubber Goods for the Medical, Surgical, Drug, Stationer and Dental Trades

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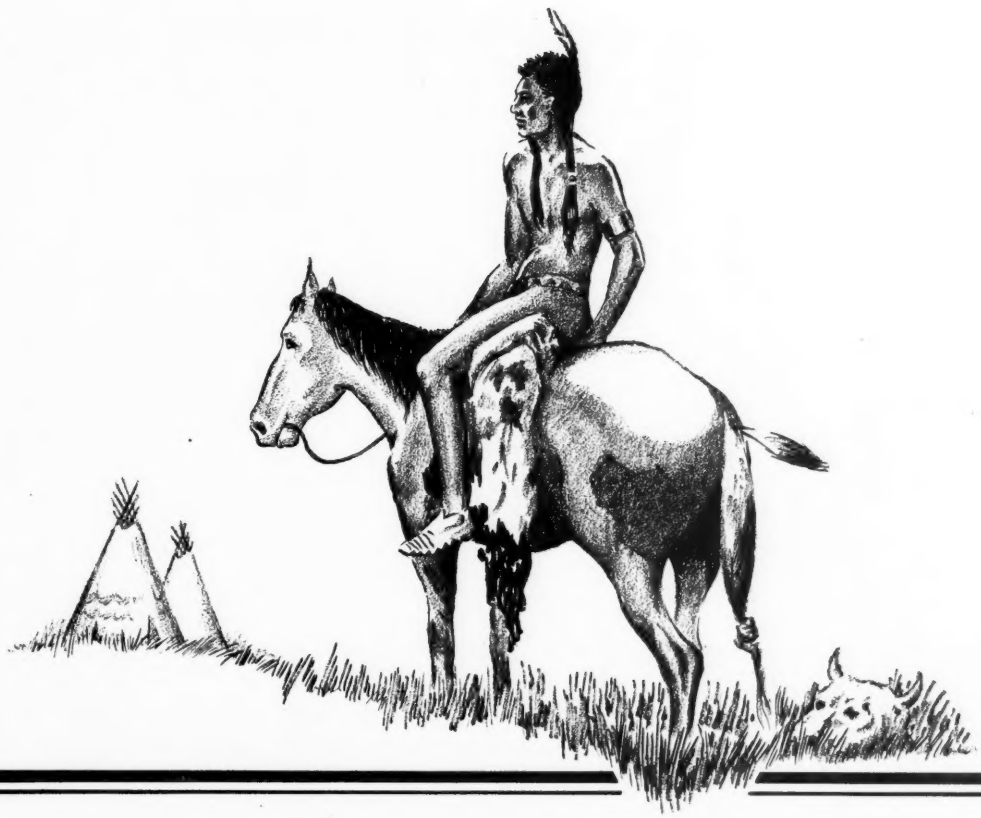

The Indian Sentry had a vital post to fill with regard to the life of his tribe, and reclaims today hold a vital position in rubber compounds.

The activity of the past months has brought out many of these advantages to compounders heretofore unfamiliar with reclaims.

It has shown tremendous saving in mixing and power costs, added tubing and calendering speeds, controllable gauges, less blistering and pitting, smoother moulding, and when purchased from plants with careful laboratory control, a uniformity unsurpassed by Crude Rubber.

Pequanoc Reclaims *cost no more*, are easily obtainable, have a reputation for quality, plus a dependable organization operating a large and growing plant.

AS FOR SERVICE, ASK THE BUYER

PEQUANOC RUBBER CO.

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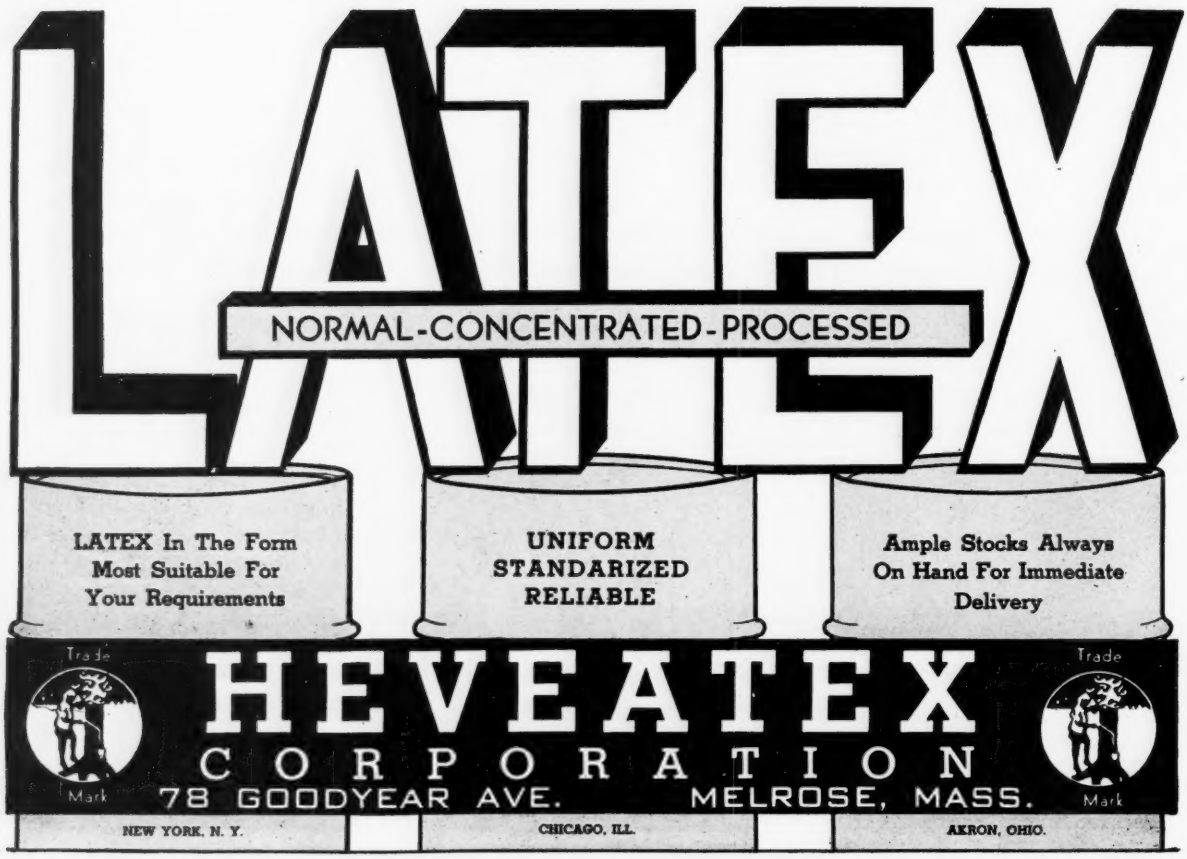

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STATISTICAL BULLETIN

OF THE

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Containing Complete Information Regarding Quotas, Production, Absorption, Stocks and Prices—Vital Information for Everyone Dealing in or Using Rubber. $2.50 per year—25 cents per single copy.

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OVER 200 PRESSES *under automatic control*

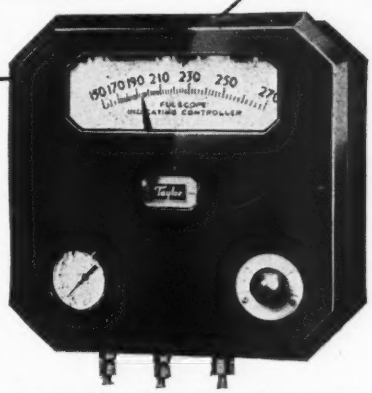
OHIO RUBBER COMPANY RELIES ON PRECISION CONTROL BY TAYLOR INSTRUMENTS TO GUARD CURING OF MECHANICAL GOODS.

Battery of platen presses **in plant of Ohio Rubber Company, at Willoughby, Ohio. Over each can be seen a Taylor Recording Thermometer and a Taylor Fulscope Indicating Pressure Controller. The Recorder gives a written record of the pressure maintained during curing.**

THE Ohio Rubber Company knows the value of automatic control in producing uniformly high quality products most efficiently and economically. Throughout the plant Taylor Fulscope Indicating Pressure Controllers maintain correct steam pressure during curing. Taylor Recording Thermometers write chart records of curing temperature so that operators know what it is at any stage of process. These two types of instruments have so proved their worth that today a controller and a recorder watch over every platen press. And there are more than two hundred presses.

This is only another example of how Taylor Instruments and Systems of Control help the industry make better products today at lower cost. For tire and tube unit vulcanizers Taylor pioneered in the development of Time Cycle Control which is now essential equipment in leading tire and rubber plants. For multiple vulcanizer hook-ups Taylor developed a System of Induced Steam Circulation. For temperature and pressure control anywhere in the processing of rubber products Taylor Instruments indicate, record or control so that finer and more uniform goods at lower cost are sure to result.

For complete information regarding the use of the instruments shown here and any Taylor Control System for your plant, ask a Taylor Representative, or write to Taylor Instrument Companies, Rochester, N. Y. Plant also in Toronto, Canada. Manufacturers in Great Britain—Short & Mason, Ltd., London, England.

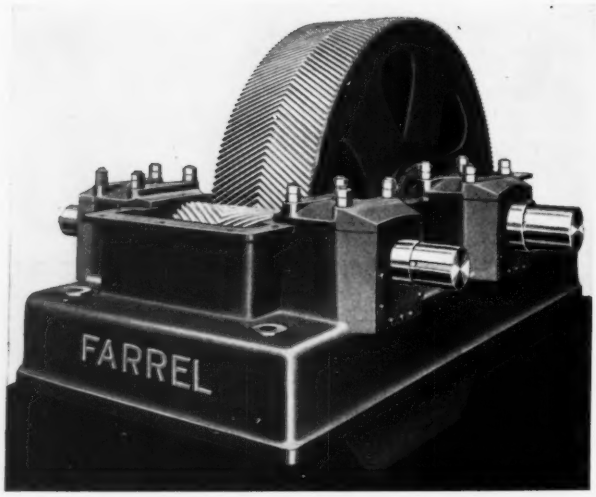


Operators like the Taylor Fulscope Indicating Pressure Controller **because of its easy-reading scale, its simple adjustment, and the speed with which it responds to new settings. The reason for the simplicity of adjustment lies in the exclusive Taylor feature to be found in every Fulscope Controller —the Universal Sensitivity Adjuster.**

Taylor

Indicating Recording Controlling

TEMPERATURE, PRESSURE, FLOW *and* **LEVEL INSTRUMENTS**



PRECISION *and* STRENGTH *for* HEAVY DUTY SERVICE

Smooth, quiet operation is as essential in large rubber mill drives as in smaller machines. The character of the loads encountered subject the drive units to stresses and shocks which are successfully withstood only if the drives are properly designed for such service and built to high standards of accuracy.

The drive illustrated is typical of the rugged design and precision manufacture of Farrel-Sykes Gear Units for rubber mill service. This unit drives a line of ten refiners and transmits 600 H.P., with a speed reduction from 600 to 80 R.P.M. Its 100% overload capacity provides a wide margin of safety for excessive peak loads.

Precision generated Sykes continuous tooth herringbone gears; permanently aligned engine type bearings; the heavy, rigid gear case and an effective lubricating system are some of the features which insure efficient, economical and dependable performance.

Farrel-Sykes Gears and Gear Units are made in any capacity up to 10,000 H.P. for every type of industrial service. They are engineered to fit the job and built to give a lifetime of satisfactory service. When you have a drive problem it will pay to consult a Farrel engineer.

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The Gear with a Backbone

FARREL

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POSITIVE QUALITY and absolute uniformity of Latex is achieved only by rigid supervision of all productive processes! For your protection, we control *every* phase of Latex production through (1) Company-Owned-and-Operated Plantations; (2) Shipment in Bulk to Minimize Variation; (3) Scientific Processing Under Laboratory Conditions. We carry stocks on hand . . . NORMAL, CONCENTRATED, and PROCESSED, for immediate delivery.

LATEX

NAUGATUCK CHEMICAL

Division of United States Rubber Products, Inc.

1790 Broadway New York, N. Y.

Beauty must be served

WHITENESS with brightness is the demand of the day in rubber products. To help manufacturers meet this trend toward eye-appealing goods, Titanox pigments give a friendly hand. Their great opacity makes for the whitest white (or brilliant tints) with a minimum of pigmentation.

From a manufacturer's viewpoint Titanox pigments are a real boon, for they have unusual working qualities such as fine particle size and imperviousness to sulphur and accelerators.

Trust **Titanox-A** (Titanium Dioxide) to produce maximum whiteness and brightness with low pigmentation.

Use **Titanox-C** (Titanium Calcium Pigment) with high refractive index and lower unit cost, when greater loading is advisable.

Our Service Dept. will gladly cooperate on technical matters.

TITANIUM PIGMENT CORPORATION

Sole Sales Agent

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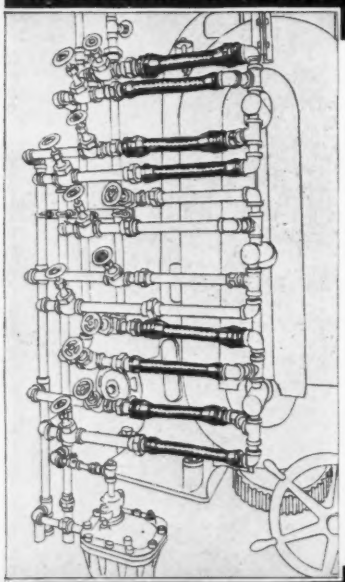

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In applications of this kind, where steam expansion and cold water contraction are factors, Rex-Weld is first choice because it is made of fatigue-resisting bronze with an extra heavy wall which withstands expansion and contraction, and still is able to move freely. Rex-Weld is the modern flexible metal hose—the hose to use for greater service—greater economy. Send today for detailed information.

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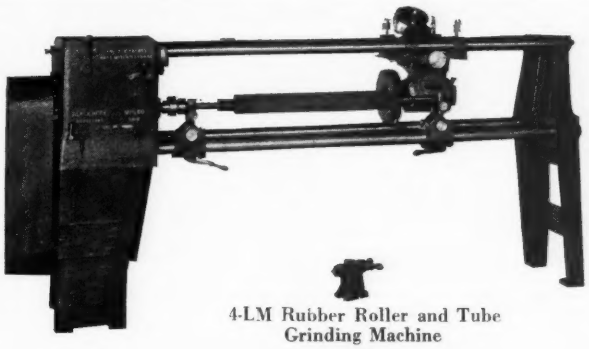
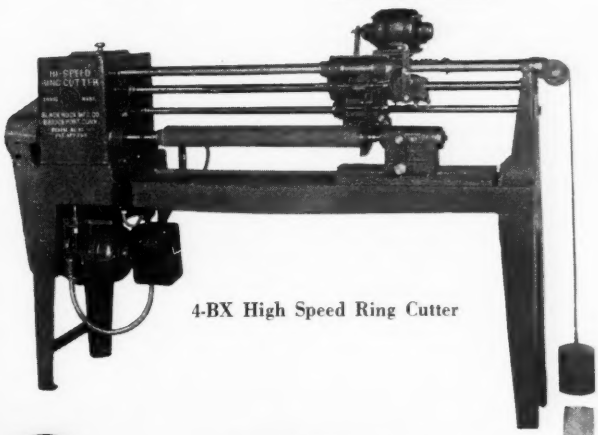
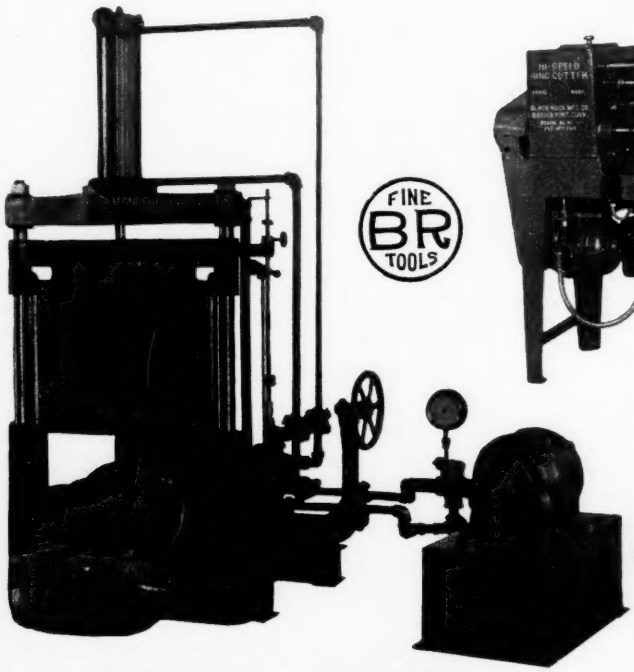


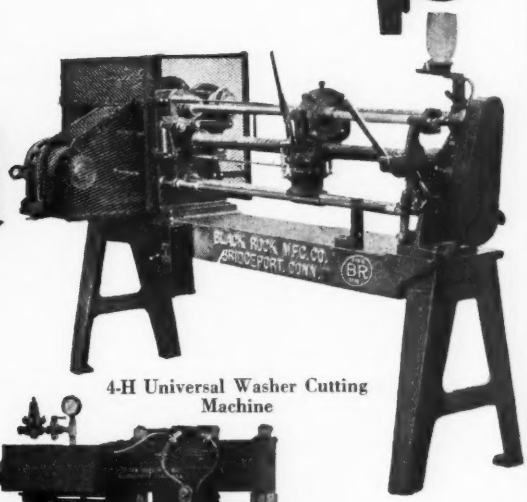
4-LM Rubber Roller and Tube Grinding Machine



4-BX High Speed Ring Cutter



Hydraulic Crude Stock Cutter 4-KBW



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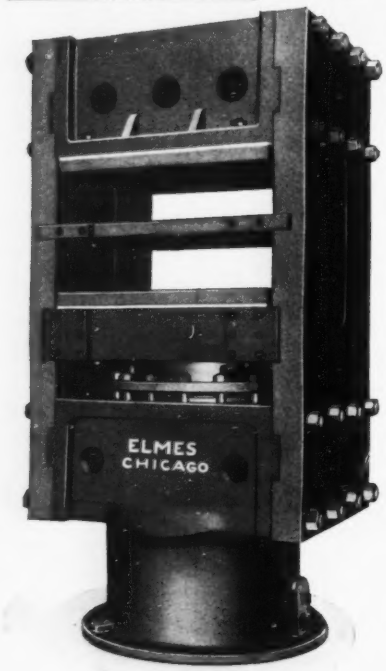

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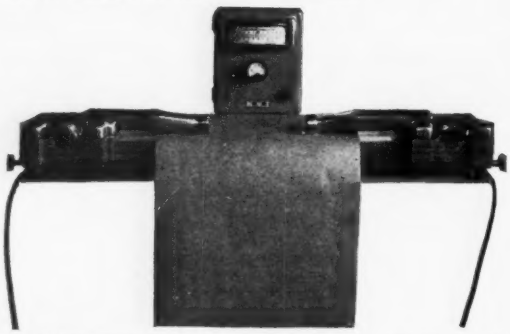

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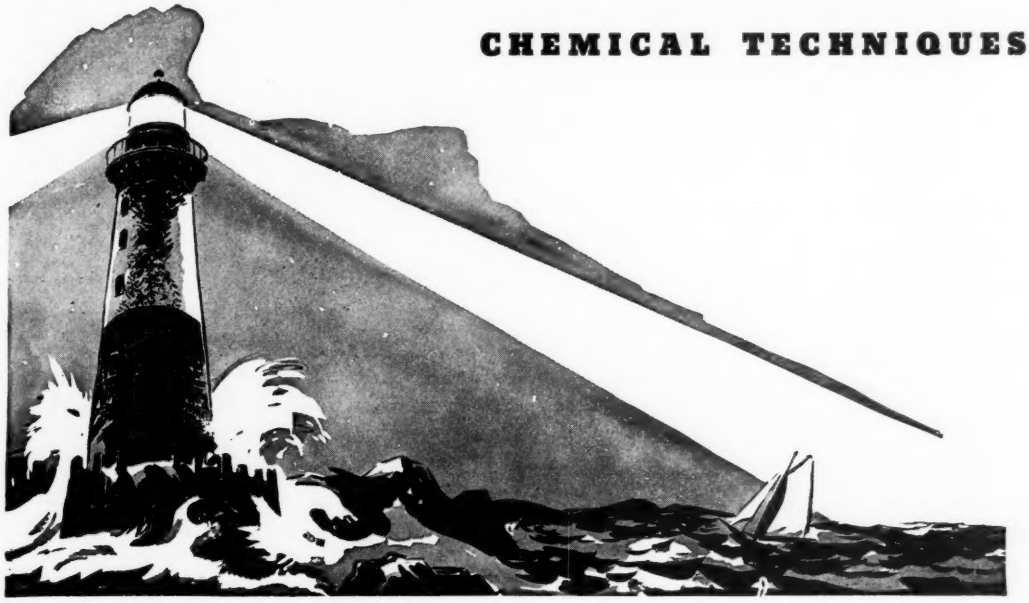

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The routine of rubber production, from the viewpoint of buyer, compounder, production staff and workmen can be facilitated greatly by close cooperation from the supplier of rubber chemicals. For this reason Cyanamid pays particular attention to individual manufacturers' needs and backs its service with technical cooperation, careful control of large production facilities and an efficiently planned distributing system that prevents delays in delivering orders where and when they are urgently needed. The following are used and recommended by many of the nation's leading rubber producers:

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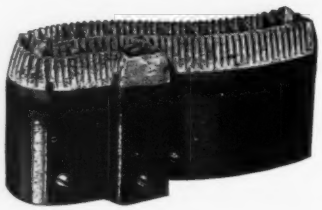

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We are in position to make delivery within thirty days after receipt of order.

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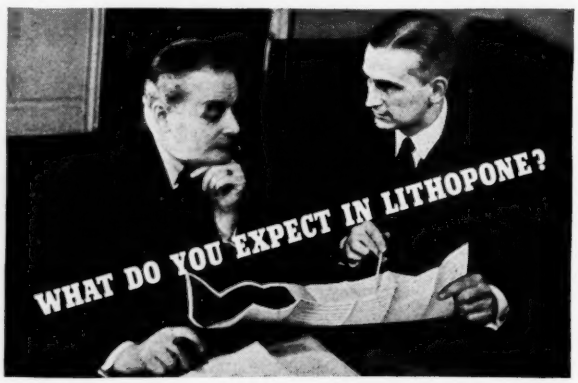

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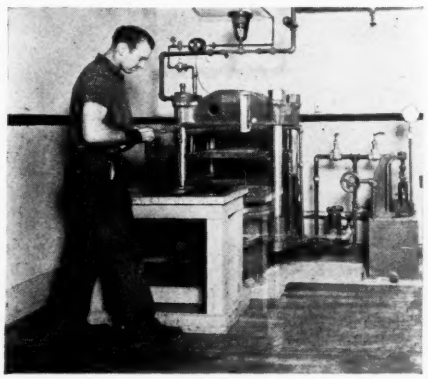

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